Longitudinal Dynamics of Trait Emotional Intelligence: Measurement Invariance, Construct Stability, and Mean Level Change from Late Childhood to Adolescence

By

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A thesis submitted to the Graduate Program in Psychology
in conformity with the requirements for the
degree of Doctor of Philosophy

Queen’s University
Kingston, Ontario, Canada
January, 2013

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Abstract

Emotional intelligence (EI) encompasses abilities (ability EI; AEI) and self-perceptions (trait EI; TEI) related to the expression, understanding, and management of emotions. Research on its developmental dynamics remains heavily weighted by the AEI perspective, whereas TEI has received virtually no attention in the developmental literature. This is a major oversight, as the two EI components are conceptually distinct and contribute independently to the prediction of important outcomes. Using multi-wave data from the Canadian National Longitudinal Survey of Children and Youth, this project examined rank-order stability (Study 1) and mean-level change (Study 2) in TEI over a 6-year period from late childhood (age 10-11) to adolescence (age 16-17). Longitudinal measurement invariance of the TEI assessment was also tested (Study 1). Longitudinal mean and covariance structures models (Study 1) and latent growth curve models (Study 2) were fitted to the data from 773 children (51% girls) who completed the Emotional Quotient Inventory–Youth Version Brief form at four biannual waves. Principles from the self-concept literature were used to outline an integrative theoretical framework within which the developmental dynamics of TEI could be studied and understood. Study 1 found that three of the four TEI domains could be measured consistently and reliably over time, and that individual differences in these domains became progressively more stable with age. Contrary to the maturity principle guiding the development of AEI, Study 2 found that mean-level changes in TEI followed a curvilinear trajectory characterizing the development of self-concepts: EI self-perceptions declined between late childhood and early adolescence and then increased later in adolescence. These findings provide, for the first time, important validity evidence for the TEI construct as developmentally distinct from AEI and developmentally similar to self-concept. From an applied standpoint, this implies that enhancing EI abilities alone may not necessarily
result in concomitant increases in EI self-concepts, and vice versa. Instead, both AEI and TEI may need to be targeted to maximize the effectiveness of intervention efforts. From a theoretical standpoint, the conceptual link between TEI and self-concept theories suggests that other properties of self-concepts might also generalize to TEI – an important avenue for future research.
Co-Authorship

The manuscripts presented in this thesis are the work of Kateryna V. Keefer, in collaboration with her graduate supervisors, Dr. Ronald R. Holden and Dr. James D. A. Parker. Kateryna Keefer was responsible for the research questions, study design, data analyses, and the initial drafts of the manuscripts. Dr. Holden and Dr. Parker were co-authors on the manuscripts and provided valuable input on research strategies, interpretations of results, and editorial feedback.
Acknowledgements

First and foremost, I would like to thank my graduate supervisors, Dr. Ronald Holden and Dr. James Parker, for their direction, support, and mentorship throughout my Doctoral work. Their extensive expertise and constructive advice encouraged me to expand the scope of my inquiries, challenge my own assumptions, seek out new professional development opportunities, and grow as a scholar and a scientist in the process. I could not have wished for better role models to work with, learn from, and emulate in my own career as a researcher and educator.

I would also like to thank my third reader and statistics instructor, Dr. Leandre Fabrigar, for his insightful feedback and statistical advice, and for making Structural Equation Modeling one of the most engaging courses I have ever taken.

Thank you to my fellow lab mates, and especially Patricia Kloosterman, whose involved discussions helped stimulate my continued progress on this project.

I would also like to thank Statistics Canada for providing access to the dataset used in this thesis, and Angela Prencipe at the Statistics Canada Toronto Research Data Centre for her help with managing the output.

Work on this thesis was funded by the Social Sciences and Humanities Research Council of Canada Joseph-Armand Bombardier Canada Graduate Scholarship, Canada Research Chair Research Fellowship, and Queen’s University Graduate Award.

Last but not least, I am grateful to my family, and especially my husband Matt, for their endless patience, enthusiasm, and support of my academic and professional endeavours.

This thesis is dedicated to the memory of my father, Vasyl Pavlovych Smoliy.
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List of Abbreviations

AD  Adaptability
ADAP  Adaptability
AEI  Ability emotional intelligence
AIC  Akaike Information Criterion
C5-8  Cycle 5-8
CFA  Confirmatory factor analysis
CFI  Comparative fit index
CI  Confidence interval
EI  Emotional intelligence
EQi  Emotional Quotient Inventory
EQi:YV  Emotional Quotient Inventory: Youth Version
ER  Interpersonal
H1-5  Hypothesis 1-5
INTER  Interpersonal
INTRA  Intrapersonal
LGM  Latent growth model(ing)
LMACS  Longitudinal mean and covariance structures analysis
LMI  Longitudinal measurement invariance
MLGM  Multiple-indicator latent growth model
NLSCY  National Longitudinal Survey of Children and Youth
PMK  Personal most knowledgeable (about the child)
RA  Intrapersonal
RMSEA  Root-mean-square error of approximation
SES    Socio-economic status
SM     Stress Management
SRMR   Standardized root-mean-square residual
STRES  Stress Management
TEI    Trait emotional intelligence
CHAPTER 1

Introduction

A prominent theme characterizing psychological research over the past two decades has been the growing focus on the role of emotions in diverse areas of study, including human development (Eisenberg, 2006), social relationships (Tiedens & Leach, 2004), achievement motivation (Eccles & Wigfield, 2002), and health and wellbeing (Salovey, Rothman, Detweiler, & Steward, 2000). Central to this line of inquiry is the idea that emotions serve important adaptive functions, and that cognitive-behavioural and affective-motivational systems are inherently interdependent – that our perceptions, decisions, and interactions not only give rise to, but are also influenced by the needs, moods, and attitudes experienced in day-to-day life (Dolan, 2002; Forgas, 2000; Lane & Nadel, 2000; Phelps, 2006). If so, then being able to appreciate the nature of one’s own and others’ feelings, to understand their causes and consequences, and to regulate them in effective and socially appropriate ways should greatly facilitate problem solving, goal attainment, and psychosocial adaptation (Izard, 2001; Salovey, 2001).

This postulate is the main premise behind the construct of emotional intelligence (EI), which was elaborated by several theorists in the 1990s as a scientific attempt to systematize the research on affective variables under a common theoretical framework (Bar-On, 1997; Salovey & Mayer, 1990). EI is conceived of as a multi-dimensional, multi-polar meta-construct that spans several psychological systems and encompasses abilities, competencies, dispositions, and beliefs related to perceiving, understanding, utilizing, and managing emotions of self and others (Bar-On & Parker, 2000a). Over the past decade, various aspects of EI have been empirically linked to life outcomes in diverse areas of functioning, from social relationships, psychological wellbeing, and physical health, to occupational success, competitive sports, and academic achievement (for
recent reviews see Brackett, Rivers, & Salovey, 2011; Jordan, Murray, & Lawrence, 2009; Keefer, Parker, & Saklofske, 2009; Martins, Ramalho, & Morin, 2010; Parker, Saklofske, Wood, & Collin, 2009; Stough, Clements, Wallish, & Downey, 2009). Given the scope of these associations, the incorporation of EI into educational programs aimed at reducing problem behaviours and promoting learning, resilience, and well-being is hardly surprising (Axelrod, O’Brien, & Weissberg, 2004; Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Greenberg et al., 2003; Kelly, Longbottom, Potts, & Williamson, 2004; Pellitteri, Dealy, Fasano, & Kugler, 2006; Qualter, Whiteley, Hutchinson, & Pope, 2007). EI-based interventions are also becoming increasingly common in postsecondary, organizational, and community settings (Nelis et al., 2011; Nelis, Quoidbach, Mikolajczak, & Hansenne, 2009; Schutte & Malouff, 2002; Slaski & Cartwright, 2003; Zijlmans, Embregts, Gerits, Bosman, & Derksen, 2011).

As the applications of EI to policy and practice become more and more widespread, so does the need for a comprehensive understanding of its temporal dynamics and the processes that govern its development, manifestation, continuity, and change across the lifespan. At present, however, knowledge of these issues remains limited and piecemeal, especially during the years prior to adulthood. Indeed, the overwhelming majority of EI studies to date have been conducted with college students and adults, whereas EI research with school-aged youth has only started to appear within the last several years (Mavroveli, Petrides, Shove, & Whitehead, 2008; reviewed in Study 1). Transition from childhood to adolescence is considered to be a particularly important period for the establishment of long-term patterns of socioemotional functioning, conferring both new opportunities for positive growth and new risks for maladjustment (Arnett, 1999; Cichetti & Rogosch, 2002). Knowing when EI is most malleable during this period can pinpoint windows of opportunity during which interventions might be most efficacious.
Likewise, knowledge of the normative changes in EI can inform more appropriate expectations about what constitutes optimal level of functioning at different times during development. Understanding the processes that may differentially influence EI at different ages can also suggest developmentally sensitive strategies for helping youth successfully navigate key life transitions. An important objective of the current program of research was to generate answers to these practical questions, focusing specifically on the transition from late childhood (age 10-11) to adolescence (age 16-17).

Extending the mainstream EI theory to pre-adult populations is important not only for supporting educational and intervention efforts, but also for advancing basic construct validity research on EI. In fact, the main impetus for the current program of research was to provide novel validity evidence to inform a perennial debate in the EI literature surrounding the heterogeneity of its definitions, operationalizations, constituent components, and nomological networks (Landy, 2005; Matthews, Zeidner, & Roberts, 2004; Murphy, 2006). As pointed out by several EI theorists (Arsenio, 2003; Schaie, 2001; Zeidner, Matthews, Roberts, & MacCann, 2003), the developmental perspective is uniquely well suited to addressing the issues of EI’s construct validity, as it allows for an explicit test of assumptions about the fundamental nature of, and the dynamic processes posited to contribute to continuity and change in various EI sub-structures. Delineating the developmental boundaries around different EI domains is an important step toward synthesizing and systematizing current knowledge in the field, as well as opening new avenues for future research on this complex multi-faceted construct.

**Theoretical Background**

Perhaps the most divisive issue in the EI literature from its inception has been the co-existence of two conceptually and methodologically distinct definitions of EI. In some models
(Mayer, Caruso, & Salovey, 1999; Mayer, Roberts, & Barsade, 2008), EI is construed as a set of emotion-related aptitudes and abilities akin to other forms of cognitive intelligence and measured with maximum-performance tests, where respondents are asked to solve problems and scenarios involving emotion understanding and reasoning about emotions (e.g., MacCann & Roberts, 2008; Mayer, Salovey, Caruso, & Sitarenios, 2003). In other models (Bar-On, 2000; Petrides, 2010), EI is conceptualized as a set of emotion-related tendencies and dispositions and assessed with typical-performance measures, where respondents are asked to self-report on their characteristic competencies and behaviours (e.g., Bar-On, 1997; Petrides, 2009). Although both types of models draw on the same content domain (i.e., perceiving, understanding, utilizing, and managing emotions), comparative studies have repeatedly found that performance-based and self-report measures of EI (a) correlate only weakly or moderately with each other; (b) are differentially associated with other constructs (performance-based – with intelligence, self-reports – with personality); and (c) contribute independently to the prediction of various criteria (Brackett & Mayer 2003; Brannick, Wahi, Arce, & Johnson, 2009; Livingstone & Day, 2005; Van Rooy & Viswesvaran, 2004; Zeidner, Shani-Zinovich, Matthews, & Roberts, 2005).

Such non-convergence between the two EI operationalizations has raised a number of questions about the nature of the constructs they measure. With respect to performance-based EI tests, concerns have been expressed over the amenability of the inherently subjective emotional experience to an objective right-or-wrong scoring format (Brody, 2004; Petrides, 2010). When the correct answer is determined by expert judgment or by consensus with the majority (two commonly used scoring criteria), high test scores may reflect something other than ability, such as declarative knowledge or conformity to social norms (Austin, 2010; Matthews, Emo, Roberts, & Zeidner, 2006). With respect to EI self-reports, many have criticized the use of the label
“intelligence”, arguing that it would be inappropriate to infer individuals’ actual EI abilities from their EI self-reports, to the same extent that self-estimates of intelligence are often inaccurate predictors of IQ test performance (Freund & Kasten, 2012). Along the same lines, self-report EI scales have been labeled as “mixed” in light of their significant associations with basic dimensions of personality (Brackett & Mayer 2003; Livingstone & Day, 2005), stressing the need to demonstrate their non-redundancy with other well-established constructs (Zeidner, Roberts, & Matthews, 2008).

In an effort to bring clarity to the field, Petrides and Furnham (2001) proposed a conceptual distinction between ability EI (AEI), as assessed with performance-based tests, and trait EI (TEI), as measured with self-report questionnaires. By defining TEI as a “constellation of emotional self-perceptions located at the lower levels of personality hierarchies” (Petrides, 2010; p. 137), the TEI theory circumvents many of the concerns outlined above. First, it explicitly acknowledges that EI self-reports measure individuals’ perceived competencies and beliefs, which may be partially based on actual EI abilities but may also reflect other factors that ultimately contribute to emotionally adaptive behaviour (e.g., dispositional tendencies, social influences, personal standards and values). Second, self-reports do not rely on the (potentially faulty) criteria of what the “correct” answer should be, instead allowing for the possibility that different profiles of perceived strengths and weaknesses might be more or less advantageous in different areas of life. Lastly, the TEI theory meaningfully integrates EI self-perceptions within the broader hierarchy of personality variables, as aspects of the self that pertain specifically to feelings and emotions (Petrides, Pita, & Kokkinaki, 2007). Initial concerns over the redundancy of EI self-reports with other existing constructs have also been largely alleviated, with growing evidence showing that TEI contributes significant incremental variance to the prediction of
various outcomes over and above the Big Five traits, mood, optimism, and other emotion-related variables (Kluemper, 2008; Mikolajczak, Luminet, & Menil, 2006; Parker, Keefer, & Wood, 2011; Petrides, Pérez-González, & Furnham, 2007; Van Der Zee & Wabeke, 2004).

This re-conceptualization of what EI self-reports mean in relation to performance-based assessments has considerably disambiguated the EI literature. Until recently, different models and measures of EI were (misguidedly) treated as interchangeable or otherwise dismissed as incompatible (Zeidner et al., 2008). Now, there is a general consensus that the two EI perspectives (AEI and TEI) are complementary rather than contradictory, each reflecting a distinct aspect of the individual’s total emotional resource (Schutte, Malouff, & Hine, 2011; Petrides, 2011). For example, some individuals may possess the emotional knowledge necessary to perform well on ability-based tasks (high AEI), but lack self-efficacy to apply their knowledge habitually in real-life situations (low TEI). In contrast, other individuals may have acquired a set of highly habitualized emotionally adaptive dispositions (high TEI), but lack explicit awareness of the underlying abilities to articulate them on a structured test (low AEI). Perhaps not surprisingly, TEI has emerged as a more robust predictor of mental health and coping effectiveness than AEI (Davis & Humphrey, 2012a,b; Gohm, Corser, & Dalsky, 2005; Martins et al., 2010; Schutte et al., 2011) – a finding that cannot be explained by common method variance (Williams, Daley, Burnside, & Hammond-Rowley, 2010). Thus, as positive self-perceptions of academic ability are uniquely implicated in greater learning effort, perseverance in the face of failure, and better academic achievement (Bandura, 1997), so are positive self-perceptions of EI abilities linked to greater coping effort, resilience against stress, and better psychological wellbeing (further evidence is reviewed in Study 2).
Unresolved Issues

Given their distinct conceptual definitions (abilities vs. dispositions), methodological operationalizations (performance vs. self-report), and nomological nets (intelligence vs. personality), do AEI and TEI follow distinct developmental paths?

A great deal of insight into the normative development of children’s emotion-related abilities (AEI) comes from the rich developmental literature that predates the EI construct (Denham, 1998; Lane & Schwartz, 1987; Saarni, 1999). This work has identified a well-defined developmental trajectory, whereby children’s knowledge and mastery of emotions progresses along a continuum of increasing competence, maturity, and sophistication. Basic capacity to recognize and produce emotional expressions is evident soon after birth, with the awareness of psychological (vs. bodily) emotional states emerging in the first 2-3 years of life, along with the ability to label and describe emotions using language. These basic abilities become increasingly more refined during pre-school and elementary school years, as children acquire deeper understanding of multiple, conflicting, and dissembled feelings, develop greater interpersonal sensitivity, and learn new strategies for regulating moods and emotions. Last to develop, throughout adolescence and young adulthood, is the insightful understanding of complex blends of feelings, appreciation of their reciprocal interrelationships, as well as mindful utilisation of emotional knowledge to promote goal attainment and wellbeing (Saarni, 2000; Lane, 2000).

In contrast, virtually nothing is currently known about the developmental dynamics of TEI prior to adulthood. To the extent that youths’ EI self-perceptions derive from their actual EI competencies, one might expect the same maturity principle that guides the development of AEI to also apply to the formation of TEI. At the same time, self-appraisals of competence are meta-cognitive constructions that draw on multiple sources of information (e.g., social comparisons,
internal standards; reviewed in detail in Study 2), only one of which is the actual ability per se (Harter, 2006; Marsh, 2007). Moreover, many higher-order cognitive skills which are required to generate accurate self-evaluations (e.g., perspective taking, abstract reasoning; reviewed in detail in Study 2) are not age invariant, resulting in periods of development during which self-perceptions may be less grounded in reality by virtue of cognitive limitations that are normative for that age (Harter, 2006, 2012). The implications of these processes for the developmental course of TEI have never been articulated theoretically or tested empirically.

To a large extent, the lack of progress in this area can be attributed to unique challenges associated with the assessment of TEI in children and adolescents (Humphrey et al., 2011; Mavroveli et al., 2008). Of major concern here is the impact of developmental change on the psychometric properties of an instrument designed to measure the very change that might compromise measurement equivalence over time (Bates & Novosad, 2005; Denham, Wyatt, Bassett, Echeverria, & Knox, 2009). Comparisons of survey responses obtained at different times during development – and the ensuing inferences about construct continuity and change – will not be meaningful if the measure does not assess the same construct in the same way across the repeated waves of administration (Marsh & Grayson, 1994). Another relevant issue is whether children possess sufficient language skills, cognitive ability, and self-insight to articulate their self-perceptions reliably on a Likert-type questionnaire (Bell, 2007; Borgers, de Leeuw, & Hox, 2000). Indeed, systematic deterioration of self-report quality at younger ages has been well documented across a variety of personality instruments and constructs (reviewed in Study 1). Although several TEI measures have been developed for use with children and adolescents (e.g., Bar-On & Parker, 2000b; Mavroveli et al., 2008), their longitudinal measurement stability (or invariance) has never been ascertained.
Overview of Current Research

The aim of the current research was to address the identified gaps in the TEI literature by first, testing the longitudinal measurement invariance (LMI) of a commonly used TEI inventory (Study 1), and second – provided that the LMI assumption could be reasonably upheld – examining the patterns of continuity and change in EI self-perceptions over a 6-year period from late childhood (age 10-11) to adolescence (age 16-17) (Studies 1 and 2). Although continuity and change can take on many forms (de Fruyt et al., 2006), the current project focused on two most commonly studied forms of change: (a) stability of individual differences (differential or rank-order continuity) – indicates whether the relative placement of individuals along the trait within a group changes over time (Study 1); and (b) mean-level change (or normative change) – indicates whether the average level of the trait in a group as a whole changes over time (Studies 1 and 2). These two forms of change are independent of each other; each answers a different substantive question that is equally informative in the study of lifespan development (Roberts & DelVecchio, 2000; Roberts, Walton, & Viechtbauer, 2006). The assessment of different types of change also requires different levels of measurement invariance (tested in Study 1).

Our main research questions were as follows: Can various aspects of TEI be measured consistently and reliably at different ages? How stable are the individual differences in TEI prior to adulthood? What is the normative developmental course of youths’ EI self-perceptions? Do demographic factors (gender, socioeconomic status) moderate these trajectories? And to what extent do self-perceptions in one EI domain (e.g., understanding of own emotions) co-develop with self-perceptions in other EI domains (e.g., sensitivity to emotions of others)?

In the absence of an existing developmental account of TEI, we drew on the well-established self-concept literature (Harter, 2006, 2012; Marsh, 2007; Wigfield & Wagner, 2005)
to outline an integrative theoretical framework within which the developmental dynamics of TEI can be studied and understood. A key theoretical proposition put forth in Study 2 (and supported on conceptual, functional, structural, and nomological bases) is that EI self-reports are best interpreted as EI self-concepts, that is, an individual’s perception of his or her own competence and evaluative judgments about the self in EI-specific domains. Making this explicit (and hitherto entirely overlooked) connection between the TEI and the self-concept literatures has provided us with a systematic and empirically-grounded platform not only for generating specific predictions about the development of EI self-concepts, but also for understanding the underlying processes that may contribute to their continuity and change (reviewed in Study 2). Moreover, the framework is highly generative for addressing other outstanding validity questions on TEI.

The current project utilizes data from four waves (or cycles) of the National Longitudinal Survey of Children and Youth (NLSCY) – a biannual population-based survey of Canadian children and adolescents conducted by Statistics Canada and Human Resources and Skills Development Canada (Statistics Canada, 2010). The objective of the NLSCY is to gather detailed nationally representative information on children’s cognitive and socioemotional development, health and wellbeing, and their social and learning environments from childhood into adolescence and young adulthood. In the last four cycles of the NLSCY (2002 to 2008), a brief form of Bar-On and Parker’s (2000b) Emotional Quotient–Youth Version (EQi:YV-Brief) was administered to children aged 10 to 17 years. The EQi:YV is a multi-dimensional instrument designed to assess four conceptual TEI domains (Intrapersonal, Interpersonal, Stress Management, and Adaptability), and it is currently one of the most widely used self-report EI measures with school-aged respondents (Humphrey et al., 2011). The current analyses were based on a subsample of 10- to 11-year-olds who completed the EQi:YV-Brief at all four cycles,
up till age 16-17 years. First of its kind, the NLSCY constitutes the most comprehensive source of longitudinal data on TEI to date. Given its high public profile and rigorous research design, the findings of the current research are uniquely positioned to make a major impact on EI-related theory, research, policy, and practice.
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CHAPTER 2

Longitudinal Assessment of Trait Emotional Intelligence: Measurement Invariance and Construct Continuity from Late Childhood to Adolescence

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Manuscript submitted for publication in Psychological Assessment
Longitudinal Assessment of Trait Emotional Intelligence: Measurement Invariance and Construct Continuity from Late Childhood to Adolescence

Transition from childhood to adolescence is a time of profound biological, psychological, and social-cognitive changes, as children enter puberty, change schools, expand their social contexts, and begin exploring questions of selfhood and identity (Lerner & Steinberg, 2009). While conferring opportunities for learning and personal growth, teenage years are also quite stressful for many individuals, as evidenced by heightened family conflict and elevated rates of internalizing (depression, anxiety) and externalizing (risk-taking, delinquency) behaviours that are more prevalent among adolescents relative to both children and adults (Somerville, Jones, & Casey, 2010; Steinberg & Morris, 2001). Although adolescent “storm and stress” has long been regarded as the developmental norm (Arnett, 1999), contemporary scholars are placing increasing emphasis on understanding the considerable inter-individual variability and intra-individual plasticity that also characterize this developmental period (Cicchetti & Rogosh, 2002; Larson, 2000; Lerner, Almerigi, Theokas, & Lerner, 2005). What are the factors that enable adolescents to cope successfully with the challenges of the transition and rebound onto a life-course of positive adaptation and growth? And how can families, educators, and policy makers capitalize on these protective factors to support healthy development for all youth?

An influential area of research that grew out of this strength-based perspective is the work on emotional intelligence (EI; Bar-On & Parker, 2000a) and its applications in social and emotional learning (SEL; Axelrod, O’Brien, & Weissberg, 2004; Greenberg et al., 2003; Kelly, Longbottom, Potts, & Williamson, 2004). As research on EI in school-aged youth gains momentum, and adoption of school-based SEL curricula becomes more and more widespread, so does the need for EI measurement tools that are developmentally appropriate and feasible to
administer across diverse populations and assessment contexts (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Humphrey et al., 2011). Although several suitable EI inventories have been developed for use with children 7 years of age and older (e.g., Bar-On & Parker, 2000b; Mavroveli, Petrides, Shove, & Whitehead, 2008), their longitudinal stability has never been ascertained. This is an important oversight, as comparisons of scores obtained at different times during development – and the ensuing inferences about stability and change – are only valid to the extent that the instrument’s measurement properties remain invariant over time (Marsh & Grayson, 1994). Having an empirically-validated EI assessment strategy is essential not only for evaluating the long-term efficacy of socioemotional programs, but also for advancing basic research on the protective factors implicated in youth resilience and adaptation. The current study contributes to this goal by examining measurement invariance of the brief form of Bar-On and Parker’s (2000b) Emotional Quotient Inventory – Youth Version (EQi:YV-Brief) across four biannual cycles of the Canadian National Longitudinal Survey of Children and Youth (NLSCY; Statistics Canada, 2010), spanning the developmental period from late childhood (age 10-11) to adolescence (age 16-17).

**Role of Trait EI in Adaptation**

As a multi-dimensional construct, EI encompasses a broad range of proficiencies (ability EI [AEI]; Mayer, Roberts, & Barsade, 2008; Salovey & Mayer, 1990) and subjective self-perceptions (trait EI [TEI]; Bar-On, 2000; Petrides, 2010; Petrides, Pita, & Kokkinaki, 2007) related to the expression, understanding, utilization, and management of emotions. Premised on the inherent interdependence between cognitive-behavioural and affective-motivational systems (Eccles & Wigfield, 2002; Forgas, 2000), EI theory posits that being skilled (high AEI) and feeling self-efficacious (high TEI) in dealing with one’s own and others’ emotions arising in day-
to-day life should greatly facilitate problem solving, goal attainment, and psychosocial adaptation (Bar-On & Parker, 2000a; Salovey, 2001). Over the past decade, this postulate has received considerable empirical support in relation to a variety of educational, occupational, and health-related outcomes (Brackett, Rivers, & Salovey, 2011; Stough, Saklofske, & Parker, 2009). The dispositional aspects of EI (TEI) have emerged as particularly robust moderators of the stress-vulnerability-resilience relationship (Armstrong, Galligan, & Critchley, 2011; Davis & Humphrey, 2012a,b; Gohm, Corser, & Dalsky, 2005; Martins, Ramalho, & Morin, 2010). When faced with real-life or laboratory-induced stressors, individuals who are more confident in their ability to understand and regulate emotions (high TEI) tend to exhibit healthier physiological responses to stress (Laborde, Brüll, Weber, & Anders, 2011; Mikolajczak, Roy, Luminet, Fillée, & de Timary, 2007), appraise the situation as less threatening and more manageable (Fernández-Berrocal & Extremera, 2006; Mikolajczak & Luminet, 2008), and engage in more proactive and fewer destructive coping practices (Downey, Johnston, Hansen, Birney, & Stough, 2010; Mikolajczak, Petrides, & Hurry, 2009; Saklofske, Austin, Mastoras, Beaton, & Osborne, 2012).

Among school-aged youth, positive EI self-perceptions (high TEI) have been implicated in a number of tangible outcomes, including lower levels of somatic complaints, depression, and externalizing symptomatology (Extremera, Durán, & Rey, 2007; Mavroveli et al., 2008; Mavroveli, Petrides, Rieffe, & Bakker, 2007; Salguero, Palomera, & Fernández-Berrocal, 2012; Siu, 2009; Williams, Daley, Burnside, & Hammond-Rowley, 2009), greater peer-rated social competence and ability to get along with classmates and peers (Frederickson, Petrides, & Simmonds, 2012; Mavroveli, Petrides, Sangareau, & Furnham, 2009; Petrides, Sangareau, Furnham, & Frederickson, 2006; Windingstad, McCallum, Bell, & Dunn, 2011), better attendance record and academic performance at school (Downey, Mountstephen, Lloyd, Hansen,
& Stough, 2008; Galla & Wood, 2012; Hogan et al., 2010; Parker et al., 2004; Petrides, Frederickson, & Furnham, 2004), and less bullying, addiction, and other problem behaviours (Kokkinos & Kipritsi, 2012; Lomas, Stough, Hansen, & Downey, 2012; Mavroveli & Sánchez-Ruiz, 2011; Parker, Taylor, Eastabrook, Schell, & Wood, 2008). Importantly, these relationships remained significant even after controlling for the effects of objective EI abilities, cognitive aptitude, and personality (Davis & Humphrey, 2012c; Di Fabio & Palazzeschi, 2009; Ferrando et al., 2011; Russo et al., 2012), underscoring the unique role of subjective competence beliefs in promoting adaptive self-regulated behaviour (Bandura, 1997; Dweck, 1999).

Given the scope of these associations, scholars are becoming increasingly interested in the longitudinal dynamics of TEI (i.e., continuity and change, trainability, prospective predictive utility), particularly during salient psychoeducational transitions, such as the move from primary school to high school (Jellesma, Rieffe, Terwogt, & Westenberg, 2011; Qualter, Gardner, Pope, Hutchinson, & Whiteley, 2012; Qualter, Whiteley, Hutchinson, & Pope, 2007; Williams, Daley, Burnside, & Hammond-Rowley, 2010), or from high school to university (Parker, Saklofske, Wood, Eastabrook, & Taylor, 2005; Parker, Summerfeldt, Hogan, & Majeski, 2004; Schutte & Malouff, 2002). Although multi-year longitudinal studies remain few and far between, a notable advance in this area has been the inclusion of TEI variables in the last four cycles of the NLSCY – a biannual population-wide survey of Canadian children and adolescents conducted by Statistics Canada and Human Resources and Skills Development Canada (Statistics Canada, 2010). The objective of the NLSCY is to gather detailed nationally representative information on children’s cognitive and socioemotional development, health and wellbeing, and their social and learning environments from childhood into adolescence and young adulthood. As such, the NLSCY constitutes the most comprehensive source of longitudinal data on TEI to date. Given its
high public profile and rigorous research design, the NLSCY is poised to provide invaluable new knowledge on the developmental trajectories, antecedents, and outcomes of TEI, as well as make a major impact on youth-related policy, research, and practice. However, before advancing any substantive inferences, it is first necessary to establish that the NLSCY’s TEI measure functions equivalently (i.e., assesses the same underlying construct in the same way and on the same scale) across repeated waves of administration (Denham, Wyatt, Bassett, Echeverria, & Knox, 2009).

Sources of Measurement Non-Invariance

Measurement non-invariance presents a formidable methodological challenge in longitudinal assessment of developmental constructs, because the very nature of children’s cognitive, emotional, and self systems is bound to change in the process of development (Bates & Novosad, 2005; Denham et al., 2009; Obradović, van Dulmen, Yates, Carlson, & Egeland, 2006). As adolescents mature cognitively and socially, their emotional schemas and abilities become increasingly more differentiated and complex, reflecting a deeper appreciation of subtle blends of feelings and contextualized emotional nuances in both self and others (Lane & Garfield, 2005; Saarni, 1999). Adolescents also become more cognizant of multiple sources of social-comparison information, prompting shifts in self-representations from generalized and overly simplistic self-views in childhood, to more socially-contingent and often conflicting self-evaluations in early and mid-adolescence, and finally to increasingly more stable, balanced, and internalized self-standards in late adolescence and young adulthood (Harter, 2006, 2012). Self-perceptions of competence similarly become more refined with age, as children’s global sense of being “smart” in general diverges into distinct self-concepts in specific performance domains, each following its own developmental course over time (Byrne & Shavelson, 1996; Marsh & Ayotte, 2003). Due to these changes, responses to the same TEI measure may produce distinct
conceptual structures at different stages of development, reflecting fundamentally different definitions of the focal construct. In the presence of such qualitative changes (gamma change), quantitative comparisons of scale responses are necessarily invalidated (Chan, 1998).

Even in the absence of substantive gamma change, measurement non-invariance can still arise from differential scaling and precision of the measuring instrument (beta change) (Chan, 1998). Of central concern here is children’s capacity to articulate their self-perceptions reliably on a Likert-type questionnaire (Bell, 2007; Borgers, de Leeuw, & Hox, 2000). Unfamiliarity with the testing process, difficulty comprehending test items and instructions, tendency to think in concrete and absolute (‘good-or-bad’) terms, suggestibility and desire to impress adults – all of these factors can contribute to inconsistencies, exaggerations, and satisficing heuristics (e.g., ‘yea’-saying) in children’s survey responses (Borgers, Hox, & Siikkel, 2004; Davis-Kean & Sandler, 2001; de Leeuw, Borgers, & Smits, 2004; Knowles & Condon, 1999; Krosnick, Narayan, & Smith, 1996).\(^1\) Indeed, personality self-reports of children and pre-adolescents have been repeatedly found to have lower internal consistency and higher prevalence of incomplete, socially desirable, and acquiescent responding, compared to self-reports of adolescents and adults (Allik, Laidra, Realo, & Pullmann, 2004; Schmitz & Baer, 2001; Soto, John, Gosling, & Potter, 2008). The general consensus is that while self-report assessment is feasible with children as young as age 6-7, the overall response quality continues to improve well into adolescence, with the largest gains occurring before age 11-12 (Bell, 2007; Borgers et al., 2000; de Leeuw et al., 2004; Soto et al., 2008). Age variations in the magnitude and randomness of these beta\(^1\)

\(^1\) Although there are other sources of beta change (e.g., habituation and practice effects, participant fatigue from repeated testing), they are less likely to affect responses collected several years apart, as was done in the NLSCY (Denham et al., 2009).
influences may, in turn, alter the metric of responses appreciably enough to confound their comparisons over time (Chan, 1998).

To be able to interpret the observed differences in responses as direct indicators of true change in the target construct (alpha change), it is essential to rule out the presence of gamma change and to correct for the confounding influences of beta change when possible (Chan, 1998). The farther apart in time the assessments, the less defensible the assumption of pure alpha change, and the more explicit the need to test it (Marsh & Grayson, 1994). Because the validity of substantive inferences from the NLSCY – and the ensuing implications for TEI theory, research, and practice – hinges critically on these assumptions, the main goal of the current study was to test longitudinal measurement invariance (LMI) of the NLSCY’s TEI measure (the EQi:YV-Brief) across four 2-year cycles spanning the critical years from late childhood (age 10-11) to adolescence (age 16-17). In evaluating whether the LMI assumption could be reasonably upheld, we also explored two substantive questions that are of central interest in longitudinal assessment (de Fruyt et al., 2006): (1) differential (or rank-order) stability of inter-individual differences, and (2) mean-level (or normative) changes in TEI over time.

**Analytical Framework**

In the present study, tests of LMI were conducted using longitudinal mean and covariance structures analysis (LMACS) – an extension of standard confirmatory factor analysis (CFA) that includes information about item and factor means in addition to variances and covariances (Chan, 1998). Within the LMACS framework, LMI can be tested and attained at four hierarchically ordered levels of increasing strength, with each level affording additional types of comparisons and substantive inferences that can be made on the basis of questionnaire responses (Meredith, 1993; Sass, 2011; Vandenberg & Lance, 2000).
At the lowest level, evidence of equivalent patterns of fixed and free factor loadings across occasions (configural invariance) must be established to verify that the basic structure of the assessment remains stable over time. Configural invariance is the minimum requirement for conducting more restrictive LMI tests; its rejection would imply that the conceptual nature of the focal construct changes qualitatively from one occasion to another (i.e., presence of gamma change), rendering any further comparisons invalid. However, support for configural invariance alone is not sufficient. Evidence of equivalent factor loadings (metric invariance) is additionally required to affirm that identical items engender the same interpretation and relate to the construct in the same way on different occasions, in turn enabling unambiguous interpretations of the factors’ structural relationships over time. Lack of metric invariance would imply that some items may be differentially calibrated to their factors (e.g., more salient or more ambiguous) on one occasion than another. However, as long as the number of non-invariant loadings is small and the factors contain at least two stable items, such inequivalences can be controlled for in a partial metric invariance model, on the assumption that the few deviations would not fundamentally alter the nature of the factors (Byrne, Shavelson, & Muthén, 1989; Steenkamp & Baumgartner, 1998). When partial metric invariance can be reasonably justified, substantive comparisons and more restrictive LMI tests may proceed.²

² Current perspectives on the treatment of partial non-invariance vary, from ignoring the non-equivalences on the assumption that they are trivial and inconsequential, to excluding the non-invariant items or scales (Millsap & Meredith, 2007). In the absence of agreed-upon criteria as to what constitutes non-trivial non-invariance or how to deal with it, we estimated both full and partial invariance models to determine whether non-invariance was “practically” significant, i.e. lead to discrepant conclusions about change (Chan, 2000; Marsh, Nagengast, & Morin, in press).
Although support of configural plus at least partial metric invariance is sufficient for making inferences about rank-order stability of individual differences, it is not sufficient for ascertaining mean-level changes over time. To enable direct comparisons of factor means, item intercepts (means) must be shown to be invariant in addition to invariant factor loadings (scalar invariance), thus ensuring that differences in item means reflect true changes in one’s standing on the underlying latent trait. Lack of scalar invariance would imply that some items may be easier or more difficult to endorse on one occasion than another, despite comparable levels of the latent trait. However, as with partial metric invariance, partial scalar invariance can be invoked to control for such inequivalences before interpreting differences in factor means (Byrne et al., 1989; Marsh et al., in press; Steenkamp & Baumgartner, 1998). The strictest level of LMI additionally requires evidence of invariant item uniquenesses (residual invariance) to ensure that identical items not only measure the same target construct in the same way and on the same scale, but that they also contain comparable amounts of residual (error) variance. Conditional on the invariance of factor variances (Little, 2000), evidence of residual invariance can be interpreted as consistency of item reliabilities over time. As such, support of residual invariance is only relevant when drawing inferences on the basis of manifest scale scores, but it is unnecessary when differences are modeled at the latent-variable level devoid of measurement error (Marsh et al., in press; Vandenberg & Lance, 2000).

Study Hypotheses

The EQi:YV-Brief measure used in the NLSCY is an abridged version of Bar-On and Parker’s (2000b) EQi:YV, a widely used multi-dimensional instrument designed to assess four conceptual TEI domains (Intrapersonal, Interpersonal, Stress Management, and Adaptability). To be minimally useful in longitudinal research, the EQi:YV-Brief was expected to show configural
plus at least partial metric invariance over time (Hypothesis 1). Developmental and psychometric literature on personality and competence self-beliefs indicates that in late childhood (around age 8-10), the structure of children’s self-reports begins to resemble the multi-dimensional structure of adults, although the dimensions may not yet be as differentiated from one another as in adolescence or adulthood (Byrne, & Shavelson, 1996; Harter, 2012; McAdams & Olson, 2010; Soto et al., 2008). Therefore, our expectation of factorial (configural plus metric) invariance was feasible for the age range covered in this study (10 to 17), with a provision that the four TEI domains might be more strongly inter-correlated at younger ages than at older ages.

Beyond the basic requirements of configural plus metric LMI, which address the critical issue of gamma change, more restrictive forms of LMI (scalar, residual) were not necessarily expected to hold (Hypothesis 2), in light of the well-documented differences in internal consistency and response styles between children and adolescents (Borgers et al., 2000; Soto et al., 2008). Rather, beta-related inequivalences were explicitly modeled via latent-level partial LMI models, and the extent of their confounding influence was determined from the discrepancies in estimates of factor correlations, variances, and means derived under the assumptions of full versus partial LMI (Chan, 2000; Marsh et al., in press).

Provided that metric and scalar LMI assumptions could be reasonably upheld, or partial non-invariance effectively controlled, we also examined substantive patterns of rank-order stability (indexed by test-retest correlations) and mean-level change (measured with standardized Cohen’s $d$ units) in the four TEI domains over time. In terms of rank-order stability, two well-supported principles characterize the development of differential psychology constructs (Fraley & Roberts, 2005; Roberts & DelVecchio, 2000): (a) test-retest correlations tend to decrease with longer time intervals between the re-tests, and (b) test-retest correlations tend to increase with
age, from moderate in childhood (in the .30s and .40s) to high in adulthood (in the .70s and .80s). Accordingly, the same patterns of decreasing stability at longer time intervals and increasing stability at older ages were expected to generalize to the four TEI domains (Hypothesis 3).

In the absence of previous developmental research on TEI, specific hypotheses for mean-level change were more difficult to formulate. To the extent that youths’ EI self-perceptions reflect their actual EI abilities, we would expect progressively increasing mean TEI levels at older ages, since emotional abilities tend to improve with age (Mayer, Caruso, & Salovey, 1999; Saarni, 1999). At the same time, self-evaluations of competence may also reflect factors other than actual ability (e.g., dispositional tendencies, social influences, personal standards and values), which may affect their developmental trajectory (Harter, 2006, 2012). For example, research on self-concepts indicates that children’s competency beliefs tend to decline, on average, during pre-adolescent and early adolescent years, albeit increasing again later in adolescence (Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002; Marsh, 1989; Wigfield & Wagner, 2005). Given these conflicting predictions, the analyses of mean-level change in TEI were kept as exploratory.

Lastly, the EQi:YV-Brief measurement and structural parameters were also compared by gender. We had no theoretical or empirical reason to expect different LMI results for boys and girls (Hypothesis 4). In fact, if the EQi:YV-Brief measurement parameters (factor loadings and item intercepts) were found to be temporally invariant for one gender but not the other, it would necessarily undermine the LMI hypothesis in the full sample. Because the principles of rank-order stability have been found to hold for both men and women (Roberts & DelVecchio, 2000), we did not expect any significant gender differences in the rank-order stability of TEI domains (Hypothesis 5). Gender differences in TEI mean levels were expected to replicate those reported
for the full-length EQi:YV (Bar-On & Parker, 2000b), namely higher Intrapersonal and Interpersonal means for girls, and higher Adaptability means for boys at all ages (Hypothesis 6).

Knowledge of the EQi:YV-Brief assessment with respect to these research questions and hypotheses would facilitate more informed interpretations of scale scores, guide the development of age- and gender-appropriate norms, and support more comprehensive investigations into the developmental trajectories and correlates of TEI.

Method

Data Source

Data for this study were drawn from several cycles of the original longitudinal cohort of the NLSCY. The study of this cohort began with a stratified probability sample of almost 23,000 children selected to represent the civilian population of all Canadian children who were 0 to 11 years old at the time of Cycle 1 data collection (1994), excluding residents of northern territories, children living on First Nations reserves, and children living in institutions (approx. 2% of the population). Subsequent data on these children were collected every two years, but the sample was truncated to about 16,000 children in Cycle 2 due to budgetary constraints and to reduce response burden on families with multiple children. About 10,000 of these children participated in the last cycle of the survey (Cycle 8 in 2008).

The NLSCY data relevant to the current study were collected in the context of a household. That is, at each cycle, persons most knowledgeable (PMK) about the child (the child’s mother in 90% of cases) provided information about themselves, the child, and other family members in a face-to-face or telephone interview administered by a trained Statistics Canada interviewer using computer-assisted interviewing. In addition, children aged 10 years and older were asked (with consent from the PMK) to complete a self-report questionnaire
booklet in a private setting at home and return their responses in a sealed envelope. Further details about the NLSCY sampling design and data collection procedures can be found in the latest NLSCY data User Guide (Statistics Canada, 2010).

**Study Sample**

The current study utilized data for a subsample of children who were 10 to 11 years old in Cycle 5 (2002) and subsequently became 12 to 13 years old in Cycle 6 (2004), 14 to 15 in Cycle 7 (2006), and 16 to 17 in Cycle 8 (2008). Analyses were restricted to this particular age cohort due to the NLSCY’s age-specific assessment strategy: for children under the age of 10 no TEI measure (or any other self-complete scale) was administered, whereas youth aged 18 years and older completed adult versions of the scales. Therefore, only the subsample that completed the same TEI measure (EQi:YV-Brief) at all four cycles was selected for this study, to ensure comparability of their scores over time and to obtain maximally informative LMI results.

The sample used in the analyses comprised 773 children (50.9% girls, 93.1% White). At the time of their first TEI assessment (Cycle 5), the majority of these children (80.4%) lived in a two-parent household. The household demographic characteristics are described in Table 1.

**Missing Data**

Following the NLSCY guidelines (Statistics Canada, 2010) and general recommendations for longitudinal research (Jeličić, Phelps, & Lerner, 2009), two types of missing data were considered: (1) total non-response, representing cycle-wide absence of the EQi:YV-Brief data and survey attrition (due to participant unavailability, deaths, relocations, changes in inclusion rules, etc.); and (2) partial non-response, representing missing responses on one or several EQi:YV-Brief items. Of the total cohort of 10- to 11-year-olds who participated in the NLSCY at
Cycle 5 (the focus of the current study), data for the EQi:YV-Brief were available for 82.8% at Cycle 5; 78.9% at Cycle 6; 74.3% at Cycle 7; and 62.1% at Cycle 8. Because participation in each preceding cycle was not required to participate in subsequent cycles, the proportion of children who responded to the EQi:YV-Brief at all four cycles was somewhat lower (52.6%). The extent of partial item non-response was very small at each cycle: 10.8% of the EQi:YV-Brief protocols at Cycle 5; 3.8% at Cycle 6; 2.4% at Cycle 7; and 2.1% at Cycle 8.

In the NLSCY, cycle-by-cycle survey attrition can be taken into account via longitudinal sampling weights provided with the NLSCY datafiles for each record (Statistics Canada, 2010). The NLSCY weights are adjusted for survey-wide non-response and post-stratified to known counts by age, sex, and province to reflect the original survey population. Accordingly, longitudinal survey weights were applied in all analyses of the current study, thereby ensuring that the results remained representative of the population demographics and less biased by total non-response. Because longitudinal stability of the item-level measurement model was the very focus of the current investigation, we were reluctant to impute missing EQi:YV-Brief data for participants who did not provide at least partial EQi:YV-Brief responses at each cycle. To explore potential biases introduced by the exclusion of cycle-wide non-respondents, participants with available data at all four cycles were compared to those with one or more cycles missing on their background characteristics at Cycle 5 and on the known EQi:YV-Brief scale scores from all available cycles. Participants who were excluded due to total non-response came from households with significantly lower ($p < .05$) income level, and their PMK and the PMK’s

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3 This 6-year attrition rate (47%) is comparable to the average attrition of 42-44% (for an average interval of 6-7 years) reported in large meta-analyses of longitudinal studies of temperament and personality (Roberts & DelVecchio, 2000; Roberts, Walton, & Viechtbauer, 2006).
spouse/partner had significantly lower \((p < .05)\) levels of education. No other demographic variables and none of the EQi:YV-Brief scales were significantly associated with exclusion due to total non-response.

To explore the impact of partial item non-response, records with missing values on 10% or fewer EQi:YV-Brief items (which comprised 87% of all partial non-respondents) were imputed using Multiple Imputation (MI) algorithm with 5 samples implemented in SPSS 19. The MI prediction of missing scores at any given cycle was based on all EQi:YV-Brief items from the same cycle plus all EQi:YV-Brief items from the preceding cycle. Pooled correlation matrices were then used as inputs in the modeling analyses. Models based on cases with partially imputed data produced virtually identical parameter estimates to those based on cases with complete data only (within .01 to .03 points of one another, on average), leading to the same study conclusions. However, indices of global model fit were systematically higher in the partially imputed sample, raising concerns of potential over-fitting of the MI models (Babyak, 2004). Because the number of cases with partial item non-response was relatively small \((N = 153)\), and these cases did not significantly differ from cases with complete data on any of the demographic variables or the EQi:YV-Brief scales, analyses based on cases with complete data \((N = 773)\), weighted for longitudinal non-response, are reported in the main results.

**Measure**

The EQi:YV (Bar-On & Parker, 2000b) is a multi-dimensional instrument designed to assess four conceptual TEI domains outlined in Bar-On’s (2000) theoretical model: Intrapersonal (INTRA; 6 items) – perceived ability to label, express, and communicate one’s own emotions; Interpersonal (INTER; 12 items) – perceived ability to understand, respect, and empathize with the feelings of others; Stress Management (STRES; 12 items) – perceived emotional sensitivity
and ability to down-regulate upsetting emotions; and Adaptability (ADAP; 10 items) – perceived ability to appraise, problem-solve, and persevere in challenging situations. The EQi:YV has been validated in a large normative sample of over 9,000 North American children and adolescents (Bar-On & Parker, 2000b), and it is currently one of the most widely used self-report EI measures with school-aged respondents (Humphrey et al., 2011). In the normative sample, the four EQi:YV subscales are moderately and positively inter-correlated (r’s = .27 to .49), with higher INTRA and INTER mean levels among girls, and higher ADAP mean levels among boys.

The abridged EQi:YV-Brief version, administered to the NLSCY respondents aged 10 to 17 years, contains 3 items per subscale (see Table 2). The items are worded in the form of short self-statements rated on a 4-point Likert-type scale (1 = “rarely true of me”, 2 = “sometimes true of me”, 3 = “often true of me”, 4 = “very often true of me”). In the NLSCY datafiles, subscale scores for each EQi:YV-Brief domain were derived by first subtracting 1 from all items and then summing the constituent items for each subscale, so that the final subscale scores ranged from 0 to 9. Response category values were reversed for the 3 STRES items. Higher scores on each EQi:YV-Brief subscale represent more positive perceptions of one’s competence in that domain.

**Statistical Analyses**

Analyses were carried out in four stages. Stage 1: Prior to testing for LMI of the EQi:YV-Brief subscales, and in the absence of comprehensive psychometric information about the

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4 The EQi:YV additionally contains a qualifier scale of General Mood, which assesses levels of happiness, self-esteem, and dispositional optimism. General Mood was not included in the present study because it is not a constituent domain of Bar-On’s (2000) EI model.

5 A copy of the full NLSCY questionnaire is enclosed in Appendix A.
instrument, a preliminary round of cross-sectional CFAs was first conducted on the data from each cycle independently, to confirm the intended 4-factor scoring structure of the scale. Configural validity of the EQi:YV-Brief was deemed to hold if these CFAs yielded internally consistent and optimally distinctive factors at each cycle. Given the excessive Type I error rates associated with the chi-square test statistic in large samples (Marsh, Balla, & McDonald, 1988), CFA model fit was evaluated using descriptive goodness-of-fit indices: the comparative fit index (CFI), the root-mean-square error of approximation (RMSEA), and the standardized root-mean-square residual (SRMR). The following graded fit criteria were applied: CFI ≥ .90, RMSEA ≤ .08, and SRMR ≤ .10 for acceptable fit; CFI ≥ .95, RMSEA ≤ .05, and SRMR ≤ .08 for good fit (Browne & Cudeck, 1993; Hu & Bentler, 1999). In addition, magnitudes of individual parameter estimates (expected loadings ≥ .30; Brown, 2006), standardized residuals, and modification indices were examined to identify potential sources and consequences of misfit in the models.

Stage 2: To test for measurement equivalence of the EQi:YV-Brief subscales over time (LMI), a hierarchical series of nested single-domain LMACS models was next fitted to the data from all four cycles simultaneously (see Figure 1 for full LMACS model parameterization). The LMI testing process began with a baseline model (Model A) with no equality constraints imposed on any of the parameters. Conditional on the acceptable fit of this baseline model (same fit criteria as in Stage 1), four increasingly restrictive models were then tested in successive order: Model B = Model A with identical factor loadings constrained to be equal across cycles (metric invariance); Model C = Model B with identical item intercepts constrained to be equal across cycles (scalar invariance); Model D = Model C with the factor variances constrained to be equal across cycles; and Model E = Model D with identical residual variances constrained to be
equal across cycles. Invariance at each level was assumed to hold if the fit of the more restrictive model was not significantly different from the fit of the preceding, less restrictive model. Because the chi-square test statistic can be overly sensitive to minor parameter changes in large samples, relative fit of the nested LMACS models was evaluated based on change in the CFI index ($\Delta$CFI), with decreases of less than .01 indicating equivalent fit (Chen, 2007; Cheung & Rensvold, 2002). For models producing larger $\Delta$CFI values, magnitudes of individual parameter estimates and modification indices were examined to identify the sources of non-equivalence. If non-invariance was localized to a few parameters only, a partial invariance model was adopted before proceeding to the next step in the sequence.

Stage 3: Provided that at least partial LMI was established, we next explored the substantive questions of stability and change in the LMACS structural parameters over time. To define the scale of the latent factors, one cycle was selected as a reference time point (by fixing its factor mean to zero), so that mean estimates at all other cycles represented mean differences ($M_{Dif}$) relative to that time point. Because residual invariance is irrelevant at the latent-variable level.

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6 For all models in the hierarchy, certain parameters were necessarily fixed for model identification and scaling purposes. In Model A, the first item’s loading and intercept were fixed to 1 and 0, respectively, at each cycle. In Model B, all factor loadings were freed to permit tests of their invariance; instead, the factor variance at Cycle 5 was fixed to 1 (factor variances at the other three cycles were freely estimated). In Model C, all item intercepts were additionally freed to permit tests of their invariance; instead, the factor mean at Cycle 5 was fixed to 0 (factor means at the other three cycles were freely estimated). Models D and E were identified in the same way as Model C.
level, estimates of factor autocorrelations and $M_{\text{dif}}$ were derived from the respective best-fitting metric and scalar LMI models. Prior to making substantive conclusions about construct stability, the “practical” implications of partial non-invariance were evaluated first (Chan, 2000; Marsh et al., in press). For partial metric LMI, standardized autocorrelation estimates obtained from the unconstrained baseline model were compared to those derived under the assumptions of full and partial metric LMI. For partial scalar LMI, estimates of factor $M_{\text{dif}}$ were compared between full and partial LMI models in terms of their standardized effect size (Cohen’s $d$). To the extent that the full LMI estimates deviated trivially from the baseline or partial LMI estimates, the LMI assumption was considered to be practically upheld. In the absence of universal rules of thumb for what constitutes a practically significant difference, effect size benchmarks must be based on empirical evidence within the specific research context (Hill, Bloom, Black, & Lipsey, 2008). We used results from a recent meta-analysis of socioemotional interventions as the benchmark for our study (Durlak et al., 2011). For the self-perceptions outcome category, Durlak et al. reported mean effect size of .23 standardized units at the end of the intervention and .11 at a 6-month follow-up. Accordingly, we considered differences under .10 units to be practically trivial.

Stage 4: An ancillary set of analyses explored gender differences in the measurement and structural parameters of the LMACS models using multiple-group LMACS analyses (Chan, 1998). Following the same logic and criteria as in Stage 2, a hierarchical series of nested multiple-group LMACS models was fitted to the multi-cycle data from boys and girls simultaneously, with identical parameters constrained to be equal between gender groups as well as across cycles. In addition to testing gender invariance of the measurement parameters (Models A through E), gender invariance of the factor autocorrelations (Model F, conditional on Model D) was examined by constraining identical factor covariances to be equal between the two
groups. Gender differences in factor means were assessed using the Cohen’s $d$ metric, with girls serving as a reference group for the purposes of factor $M_{\text{Diff}}$ identification.

All CFA and LMACS models were tested with EQS 6.1 for Windows structural equation modeling software (Bentler, 2005) using weighted correlation matrices with means and standard deviations (generated with SPSS 19) as model inputs. Examination of the variable distributions revealed no univariate or multivariate outliers that were significantly disconnected from the distributions’ tails, and the variables presented no problems of normality, with skewness ranging from -.93 to .26 and kurtosis ranging from -1.0 to .10. Therefore, maximum-likelihood estimation procedure was implemented for all models. Effect sizes for mean difference tests were calculated with G*Power 3.1 (Faul, Erdfelder, Lang, & Buchner, 2007) using the matched-pairs module for cross-cycle comparisons and the two-groups module for gender comparisons.

**Results**

**Cross-Sectional Analyses**

The intended 4-factor structure of the EQi:YV-Brief demonstrated acceptable fit to the data at Cycles 5 and 6, CFI ≥ .915, RMSEA (90% CI) ≤ .074 (.065, .083), SRMR ≤ .061, and marginal fit at Cycles 7 and 8, CFI ≥ .891, RMSEA (90% CI) ≤ .090 (.081, .099), SRMR ≤ .067. The main source of misfit at Cycles 7 and 8 was a significant residual covariance between items ER2 and SM2, both of which refer to greater emotional sensitivity either in response to others’ emotions (ER2) or in general (SM2). These two items are also listed adjacent to each other on the questionnaire, raising the possibility of item-order effects. Because responses to the SM items are reverse-keyed, the residual correlation between ER2 and SM2 was negative ($r = -.38$ and -.27 at Cycles 7 and 8, respectively). Although taking this residual covariance into account resulted in significant improvements in fit ($\Delta$CFI = .034 and .012 at Cycles 7 and 8), the
magnitudes of factor loadings remained practically unchanged (average change = .01, largest change for an individual item = .05 increase). Therefore, the more parsimonious initial models were retained for interpretation.

All 12 items loaded moderately to strongly (.46 to .96) on their respective factors at all four cycles, supporting the stability of the EQi:YV-Brief four-factor structure across assessments (see Table 3). Congruent with their full-length counterparts, the abridged INTRA, INTER, and ADAP factors were moderately and positively inter-correlated, although the magnitude of their associations decreased over time (average r’s = .51, .46, .31, and .23 at Cycles 5, 6, 7, and 8, respectively). Unexpectedly, the STRES factor showed weak to non-significant associations with the other three factors at all four cycles (see Table 3), which is inconsistent with the full-length version of the scale (Bar-On & Parker, 2000b). The four EQi:YV-Brief subscales varied somewhat in their internal consistency. The average strength of the factor loadings was higher for INTRA (.78) and ADAPT (.73), than for STRES (.68) and INTER (.59). Analogously, average item reliabilities and inter-item correlations ($R^2$/MIC) were highest for INTRA (.63/.61) and lowest for INTER (.36/.35), with ADAP (.53/.53) and STRES (.48/.45) falling in between (see Table 3). Evident at all four cycles, these between-domain differences suggest that the constructs measured by the INTER and STRES subscales were more conceptually heterogeneous than the constructs measured by the INTRA and ADAP subscales.

Taken together, the results of the cross-sectional CFAs supported the configural validity of the EQi:YV-Brief assessment – a critical prerequisite to conducting stricter tests of LMI.
Longitudinal Analyses

**Statistical tests of LMI.** The baseline LMACS models provided acceptable or good fit to the data for all four EQi:YV-Brief subscales, CFI ≥ .944, RMSEA (90% CI) ≤ .069 (.058, .081), SRMR ≤ .049, which allowed further tests of invariance of their measurement parameters (presented in Table 4). Model comparison results from the nested LMACS analyses are summarized in Table 5. The INTRA and ADAP subscales demonstrated full metric invariance across the four cycles (Model B), indicating that the salience of their items in relation to their respective factors remained relatively stable, or changed only in small increments over time. The INTRA items additionally showed full scalar invariance (Model C), indicating that the observed differences in item means reflected systematic changes in the INTRA factor means over time.

However, one item on the ADAP subscale (AD3) showed some differential functioning at Cycle 5. For reasons other than their mean standing on the ADAP factor, the participants found this item disproportionately easier to endorse at Cycle 5, resulting in a higher AD3 mean score than what would be expected based on the ADAP factor mean. To account for this significant non-equivalence, a partial scalar invariance model was adopted for ADAP (Model C1 in Table 5).

INSERT TABLES 4 AND 5 HERE

The INTER and STRES subscales each contained one item (ER1 and SM2, respectively) that functioned differentially over time, which resulted in lack of statistical support of full metric and scalar invariance for these two subscales (Models B and C in Table 5). Specifically, ER1 was significantly more strongly related to the INTER construct at Cycle 5 than at later cycles, and it also received disproportionately higher mean ratings than what would be expected based on the INTER factor mean at Cycle 5. Similarly, SM2 was significantly more differentiated from the STRES construct at later cycles (Cycles 6 and 7); the participants also found this item
disproportionately easier to endorse at Cycle 5, resulting in a lower SM2 mean score (after reverse-scoring) than what would be expected based on the STRES factor mean. To account for these significant non-equivalences, partial metric and scalar invariance models were adopted for INTER and STRES (Models B1 and C1).

As anticipated, the strictest form of LMI (residual invariance) was not supported for any of the subscales (Models E in Table 5). In the presence of invariant factor variances (Models D), significant non-equivalences in residual variances served as evidence of differential item reliabilities. The largest sources of reliability non-equivalence were associated with the Cycle 5 parameters, which differed significantly for most items. Accordingly, releasing the equality constraints on the Cycle 5 residual variances (Models E1) produced significant improvements in model fit for all four subscales ($\Delta$CFI ≥ .011). Significant residual non-equivalences were also found for several Cycle 6 parameters (e.g., ER3, SM2, AD2), although for the most part item reliabilities were stable across Cycles 6, 7, and 8 (see Table 4).

**Practical significance of partial LMI.** Table 6 presents estimates of rank-order stability coefficients for the EQi:YV-Brief subscale scores and their corresponding LMACS latent factors, expressed in the form of first-, second-, and third-order autocorrelations. Estimates obtained from the baseline, partial metric LMI, and full metric LMI models were very close in magnitude (within .04 points of one another), suggesting that the identified non-equivalences in factor loadings had trivial impact on the substantive correlational results. Although stability coefficients for the manifest subscale scores were expectedly more attenuated (by about .08 points, on average) compared to their corresponding latent-level estimates (albeit less so for INTRA due to its higher reliability), they presented a comparable picture of continuity and
change. In terms of practical significance, therefore, the assumption of longitudinal metric invariance was upheld for all four EQi:YV-Brief subscales across all four cycles.

**INSERT TABLE 6 HERE**

Table 7 summarizes cycle-by-cycle $M_{\text{Diff}}$ estimates for the EQi:YV-Brief subscale scores and their corresponding latent factors, expressed in standardized Cohen’s $d$ units. Between Cycles 6 and 7 and Cycles 7 and 8, $M_{\text{Diff}}$ estimates based on full and partial LMI models and the observed subscale scores all yielded practically identical results (within .01 or .02 $d$ units of one another), supporting full scalar invariance for this time period. Between Cycles 5 and 6, however, this was the case only for INTRA and STRES. Due to the elevated ER1 and AD3 intercepts at Cycle 5, the estimates of Cycle 5/6 $M_{\text{Diff}}$ for INTER and ADAP were biased upward (by about .10 $d$ units) when computed under the assumption of full scalar invariance (i.e., full scalar LMI models and manifest subscale scores). These discrepancies were large enough to alter the substantive conclusions, implying significant (vs. non-significant) mean-level change for INTER and moderate (vs. small) mean-level change for ADAP. Although the SM2 intercept was also found to be non-invariant at Cycle 5, its impact on the estimate of Cycle 5/6 mean difference for STRES was small (discrepancy of .03 $d$ units) and, most importantly, resulted in the same substantive conclusion (non-significant mean-level change). Therefore, from the standpoint of practical significance, the assumption of longitudinal scalar invariance was upheld for INTRA and STRES across all four cycles, and for INTER and ADAPT across Cycles 6, 7, and 8.

**INSERT TABLE 7 HERE**

**Latent-construct continuity.** Inter-individual differences on the four EQi:YV-Brief factors exhibited a moderate degree of rank-order stability over the 6-year study period (see Table 6). As expected, scores obtained closer together in time were, on average, more highly
autocorrelated than scores obtained at more distal time points (average $r$’s = .48 first-order, .37 second-order, and .32 third-order). Also as expected, the 2-year test-retest correlations tended to increase in magnitude from cycle to cycle, from an average of .39 (Cycles 5/6) to .45 (Cycles 6/7) and .61 (Cycles 7/8). These results suggest that while the rank-ordering of individuals on the EQi:YV-Brief factors changed appreciably between Cycles 5 and 6 (ages 10-11 to 12-13), individual differences became increasingly more stable from Cycle 6 (age 12-13) onward.

In terms of mean-level change, results from partial scalar LMI models revealed a complex picture for the sample as a whole (see Table 7). Mean levels of INTRA decreased from Cycle 5 to Cycle 6 (ages 10-11 to 12-13) and then remained relatively unchanged from Cycle 6 onwards (ages 12-13 to 16-17). Mean levels of INTER remained unchanged between Cycles 5 and 6 and then increased monotonically from Cycle 6 onwards. Mean levels of STRES remained unchanged between Cycles 5 and 6, decreased at Cycle 7 (age 14-15) and stayed unchanged at Cycle 8 (age 16-17). Lastly, mean levels of ADAP decreased monotonically between Cycles 5 and 7 and then increased at Cycle 8. The magnitudes of mean-level changes were relatively small throughout the 6-year study period ($d \leq .16$).

**Gender Differences**

The baseline multiple-group LMACS models provided acceptable fit to the male and female data: CFI $\geq .950$ (except .884 for INTER), RMSEA (90% CI) $\leq .069$ (.061, .077), SRMR $\leq .065$, and were followed by the nested model comparisons analogous to those conducted in the full sample. Due to space limitations, only a concise summary of key findings is presented here, but complete results are available upon request.\(^7\)

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\(^7\) Enclosed in Appendix B
**Measurement invariance.** For three of the four EQi:YV-Brief subscales (all but STRES), the LMI results for boys and girls were consistent with those reported for the full sample. The assumption of cross-gender invariance was practically upheld for the INTRA subscale across all four cycles, allowing comparisons of the INTRA scores between boys and girls and over time. The INTER and ADAP subscales showed partial cross-cycle and cross-gender invariance, such that the INTER and ADAP scores were comparable between boys and girls and over time across Cycles 6, 7, and 8, but not at Cycle 5 (due to differential functioning of items ER1 and AD3). The STRES subscale demonstrated acceptable LMI for girls; for boys, however, neither full nor partial invariance could be supported, as only one item (SM1) showed evidence of cross-cycle and cross-gender comparability. Because 2 out of 3 SM items were non-equivalent across 2 out of 4 cycles for boys (after reverse-scoring, the SM2 intercepts were significantly higher at Cycles 7 and 8, whereas the SM3 intercepts were significantly lower at Cycles 5 and 6), these non-equivalences were extensive enough to confound meaningful comparisons of the STRES scores across gender, as well as in the full sample over time.

**Structural parameters.** Significant gender differences in latent-factor means consistent with the full-length EQi:YV assessment were found for the Brief INTRA, INTER, and ADAP factors. Specifically, girls had significantly higher INTRA levels than boys, and this gender difference remained consistent, albeit modest in magnitude, across all four cycles ($d’s = .22, .15, .20, \text{ and } .18$ at Cycles 5, 6, 7, and 8, respectively). Girls also had substantially higher INTER levels than boys across all four cycles, and this gender gap widened even further at the later two cycles ($d’s = .53, .59, .67, \text{ and } .69$). In contrast, boys had significantly higher ADAP levels than girls across all four cycles ($d’s = .16, .44, .28, \text{ and } .41$). Of note, comparisons of the manifest
subscales scores produced very similar results (within .05 \(d\)-units), barring a slight overestimation (by .09 \(d\)-units) of the gender difference in ADAP at Cycle 5.

For INTRA and ADAP, the magnitudes of latent-factor variances and autocorrelations were comparable between boys and girls (\(\Delta\text{CFI} \leq .004\)), with patterns of rank-order stability similar to those found in the full sample. For INTER, there was evidence of cross-cycle and cross-gender non-homogeneity of factor variances (\(\Delta\text{CFI} = .027\)), such that the extent of inter-individual variability in INTER decreased significantly for girls but not for boys at the later two cycles (Cycles 7 and 8). Consequently, the patterns of factor autocorrelations for INTER also significantly differed between boys and girls (\(\Delta\text{CFI} = .011\)), revealing greater rank-order stability among girls than among boys (average autocorrelation = .43 vs. .33). Coupled with the higher INTER mean levels among girls and their increasing trend over time, the concomitant reduction in variability and increase in differential stability point to a potential ceiling effect in the assessment of INTER among girls at older ages.

Gender differences in STRES levels were more difficult to interpret. Partial scalar LMI models estimated girls to have significantly higher latent-factor means than boys at Cycles 5 and 6 (\(d = .10\) and .17), with little gender difference at Cycles 7 and 8 (\(d = .03\) and .04). In contrast, comparisons of the manifest subscale scores indicated a reversal of gender differences with age, with girls scoring higher than boys at Cycles 5 and 6 (\(d = .15\) and .24), but boys scoring higher than girls at Cycles 7 and 8 (\(d = .19\) and .07). The pattern of factor autocorrelations for boys also revealed an abrupt change in their rank-ordering on the STRES factor between Cycle 5 and the later three cycles (average Cycle 5 autocorrelation = .10), with virtually no change in inter-individual variability occurring from Cycle 6 onwards (average Cycle 6/7/8 autocorrelation = .73). In contrast, the increase in rank-order stability among girls was more gradual (.35 vs. .50).
Given the uncertainty of the partial measurement invariance assumption for STRES, these substantive results should be interpreted with caution.

**Discussion**

Amidst the growing public efforts to promote positive development and socioemotional learning in school-aged youth, trait emotional intelligence (TEI) has emerged as an important protective factor in the processes of resilience and adaptation. Multi-wave longitudinal datasets like the NLSCY present a unique opportunity to study the developmental dynamics of TEI during salient psychosocial transitions from childhood to adolescence and into emerging adulthood, yet they also pose unique methodological challenges. Of particular concern is the impact of developmental change on the psychometric properties of an instrument designed to assess the very change that may compromise its validity and reliability. When drawing inferences about children’s developing EI self-perceptions on the basis of survey responses, the questions of longitudinal measurement invariance (LMI) become paramount. Are the survey responses obtained at different ages amenable to the same scoring structure (configural LMI), and if so, do they permit valid inferences about the stability of individual differences (metric LMI) and mean-level changes (scalar LMI) in the TEI construct over time? The aim of the current study was to provide the NLSCY users with answers to these questions in relation to the abridged version of the EQi:YV (the EQ-i:YV-Brief), and to outline a preliminary sketch of the normative development of TEI from late childhood (age 10-11) to adolescence (age 16-17).

**Longitudinal Measurement Invariance**

As a minimum requirement, we expected evidence of configural plus at least partial metric LMI (Hypothesis 1), and our results supported this minimum expectation. At the configural level, the intended structure of the EQi:YV-Brief provided adequate fit to the data and
yielded four internally coherent (factor loadings = .46 to .96) and conceptually distinctive (inter-factor r’s = -.12 to .56) factors at each time point. There was also evidence of increasing differentiation of the TEI domains with age: the average absolute magnitude of inter-factor correlations decreased from .31 at age 10-11 to .16 at age 16-17. These findings are consistent with the broader developmental and psychometric literature, which indicates that by age 10 the structure of children’s personalities and self-concepts already tends to resemble that of adults, although the dimensions may not yet be as differentiated from one another (Byrne, & Shavelson, 1996; Harter, 2012; McAdams & Olson, 2010; Soto et al., 2008).

At the metric level, the majority of the EQi:YV-Brief items maintained consistent relationships to their respective factors, indicating that the same underlying latent constructs were being assessed throughout the 6-year study period. Only two of the 12 items changed their meaning with age. From age 12-13 onwards, the Interpersonal item tapping perceived ability to effect positive emotions in others became more differentiated from items measuring perceived ability to empathize with negative emotions of others. From age 14-15 onwards, the Stress Management item tapping perceived tendency to experience distress became more differentiated from items measuring perceived tendency to experience anger-related emotions. Although these non-equivalences represented gamma-type change associated with increasing complexity and differentiation of emotional schemas (Lane & Garfield, 2005; Saarni, 1999), their presence had minimal impact on the substantive rank-order stability results. Therefore, all four EQi:YV-Brief subscales are suitable for studying the differential dynamics of TEI (i.e., correlates and antecedents, rank-order stability, prospective predictive utility).

As anticipated (Hypothesis 2), the assumption of scalar LMI was less ubiquitously supported, calling for some additional considerations when using the EQi:YV-Brief to study
mean-level changes in TEI over time (e.g., t-tests, analyses of variance, trajectories of growth). Specifically, at age 10-11 several EQi:YV-Brief items elicited disproportionally higher mean responses than what would be expected based on the estimates of true latent-trait levels at that age. Given younger children’s greater propensity toward suggestibility and exaggerated responding (Borgers et al., 2000; de Leeuw et al., 2004), these unusually positive answers may flag items (e.g., “I like doing things for others”) that are particularly susceptible to social desirability biases. Our results demonstrated that failure to correct for such differential item functioning can lead to an over-estimation of mean levels at younger ages and, ultimately, inaccurate conclusions about the magnitude of mean-level change. Therefore, some adjustment for beta non-invariance should be implemented when working with pre-adolescent data, either in a partial scalar LMI model as was done here, or by applying age-specific norms as commonly practiced with the full-length EQi:YV (Bar-On & Parker, 2000b).

It should be noted that the overall quality of the EQi:YV-Brief responses was also lower at age 10-11 compared to older ages, characterized by higher rates of partial item non-response (11% vs. 2-4%) and larger amounts of residual (error) variance (53% vs. 45%). This issue is not exclusive to the EQi:YV-Brief, as systematic deterioration in self-report quality under the age of 11-12 has been documented across a variety of personality instruments and self-constructs, attributable to limited reading comprehension and still-developing cognitive functions at that age (Borgers et al., 2000; Davis-Kean & Sandler, 2001; Parker, Eastabrook, Keefer, & Wood, 2010; Soto et al., 2008). Nevertheless, this finding makes a strong case for using latent-variable techniques that can correct for measurement non-reliability when analyzing self-reports of pre-adolescents.
From age 12-13 onward, three of the four EQi:YV-Brief subscales (Intrapersonal, Interpersonal, and Adaptability) produced internally consistent assessments that were fully comparable not only longitudinally, but also across gender (partial support for Hypothesis 4), allowing meaningful analyses of age and gender differences in mean levels of these TEI domains. As on the full-length EQi:YV (Hypothesis 6), girls scored significantly higher on the Intrapersonal and Interpersonal subscales, whereas boys scored significantly higher on the Adaptability subscale of the EQi:YV-Brief; these gender differences remained relatively consistent over time. However, the assumption of scalar LMI for the Stress Management subscale failed to replicate across gender, thereby invalidating its scalar LMI in the full sample as well. For reasons other than their standing on the latent trait, boys found 2 of the 3 Stress Management items disproportionately easier to endorse at younger ages (10-11 and 12-13) compared to older ages (14-15 and 16-17). As a result, boys scored lower on Stress Management (after reverse-scoring) than girls in pre-adolescence, but higher in adolescence – a pattern that did not necessarily reflect true age or gender differences in the underlying latent trait. The pattern of rank-order stability in Stress Management for boys was also inconsistent with the expected progressive increase in test-retest correlations with age (partial support for Hypothesis 5).

Because Stress Management items are the only reverse-keyed items on the scale, and their order is admixed with the true-keyed items during administration, the seemingly abrupt reversal of item and scale means is highly indicative of an acquiescent response set (i.e., endorsing items regardless of their content or wording), which tends to be especially problematic among younger respondents (Benson & Hocevar, 1985; Marsh, 1986; Schmitz & Baer, 2001; Soto et al., 2008). Item-wording effects may also be responsible for the lack of significant positive correlations between Stress Management and the other three TEI domains, raising
further questions as to what exactly this subscale measures. At this time, we would refrain from using the EQi:YV-Brief Stress Management subscale to study mean-level changes over time. In future validations of this measure, it will be important to examine its convergent and discriminant validity in relation to other variables and constructs; even though it may not function appropriately for children, it could still be valid in research with adolescents.

A methodological strength of this study is that our LMI conclusions are based not only on the statistical criteria of model and parameter fit, but also on the practical implications of different assumptions (full vs. partial LMI) for substantive inferences about construct continuity and change (Chan, 2000; Marsh et al., in press). Following the recommendations for deriving empirical effect size benchmarks (Hill et al., 2008), our criteria for practical significance were based on a recent meta-analysis evaluating the impact of school-based socioemotional interventions on change in students’ self-perceptions (Durlak et al., 2011). By incorporating metrics of practical significance (i.e., standardized effect size measures, $r$ and $d$), we were able to more judiciously sort out spurious non-equivalences, which can be safely ignored in practice, from those that appreciably altered the substantive conclusions. Whereas if we relied on the statistical criteria alone to decide whether to accept or reject the LMI hypothesis, it would have been rejected for three of the four EQi:YV-Brief subscales (all but Intrapersonal). Because we reported both sets of results, readers can exercise their own judgment when deciding on the most appropriate uses of the EQi:YV-Brief assessment.

**Construct Continuity and Change**

Establishing (partial) metric LMI for the four EQi:YV-Brief subscales allowed us to explore patterns of their differential continuity from late childhood to adolescence. As expected (Hypothesis 3), test-retest correlations tended to decrease at longer time intervals (from .48 at 2-
year retest, to .32 at 6-year retest, on average) and to increase with older age (from an average of .39 between ages 10-11 and 12-13, to .61 between ages 14-15 and 16-17). These findings are fully consistent with the principles characterizing the development of personality structures (Fraley & Roberts, 2005; Roberts & DelVecchio, 2000), suggesting that while the rank-ordering of individuals changes gradually over time, inter-individual differences become increasingly more stable with age. The period marking the immediate transition from late childhood to early adolescence (ages 10-11 to 12-13) was characterized by the greatest degree of instability. These years coincide with a number of rapid changes (e.g., onset of puberty, move from primary to high school) that create both new opportunities for positive growth and new risks for maladjustment (Cicchetti & Rogosch, 2002; Eccles, 1999). That children’s TEI levels at age 10-11 were only moderately predictive of their TEI levels at age 12-13 suggests that, much like self-perceptions in other areas (Harter, 2006, 2012), EI competency beliefs at this age are rather malleable and sensitive to contextual inputs from the environment. Consequently, EI-focused interventions may be particularly efficacious at the transition to adolescence.

Establishing (partial) scalar LMI for the Intrapersonal, Interpersonal, and Adaptability subscales of the EQi:YV-Brief further allowed us to explore mean-level changes in these three TEI domains. Results revealed a complex pattern of decreases, increases, and plateaus that varied depending on age and the specific TEI domain. For example, between late childhood and early adolescence, self-perceptions in the Intrapersonal and Adaptability domains showed significant declines, whereas between middle and later adolescence, self-perceptions in the Interpersonal and Adaptability domains showed significant increases. The increases in perceived EI competencies at older ages are congruent with the expectation that emotional abilities should improve progressively with maturation and life experience (Mayer et al., 1999; Saarni, 1999).
However, the declines in EI self-perceptions at younger ages are contrary to this emotional maturity hypothesis, and instead parallel the declines observed for self-concepts and competency beliefs in other domains (Jacobs et al., 2002; Marsh, 1989; Wigfield & Wagner, 2005).

A number of factors can contribute to such systematic corrosion of self-confidence in early adolescence. As children mature cognitively and socially, they are able to generate more realistic and down-to-earth self-appraisals of their strengths and weaknesses, and they also become more self-conscious about how they compare to their classmates and peers (Harter, 2006, 2012). Adolescents’ confidence in their ability to understand and regulate emotions can also diminish in the context of heightened emotional sensitivity and impulsivity that accompany the onset of pubertal growth (Somerville et al., 2010). The move from primary to high school may also bring about new rules and expectations, prompting young adolescents to adopt higher standards for evaluating how competent they are (Wigfield & Wagner, 2005). Cumulative impact of these influences may produce the observed decreases in EI self-perceptions even if actual EI abilities continue to improve during this time. Although only preliminary, these findings suggest that the ability-based and trait-based components of EI may follow distinct developmental paths prior to adulthood – an intriguing possibility that warrants future investigation.

Because the current study represents the first attempt to document mean-level changes in TEI over an extended multi-year period, our analyses were necessarily exploratory and will need to be followed up with more targeted investigations, including explicit tests of linear and non-linear patterns of growth, joint models of correlated development between multiple TEI domains, and moderators of individual differences in the developmental trajectories. Apart from questions of differential stability and mean-level change addressed in the current study, future studies could explore other types of construct continuity, such as individual-level trajectories of change.
and within-person stability of multi-dimensional TEI profiles over time (de Fruyt et al., 2006). Latent growth curve modeling (LGM) techniques would be particularly suitable for these follow-up analyses, as they can accommodate all of these complex research questions and also allow the inclusion of various moderators of change in the models (Duncan & Duncan, 2004). Because the LGM procedures require evidence of at least partial scalar LMI (Chan, 1998), the current study constitutes the necessary first step towards making these more advanced analyses possible.

**Limitations and Conclusions**

The TEI measure used in the NLSCY, and analysed here, is a highly abridged version of the original EQi:YV assessment (Bar-On & Parker, 2000b). Although its truncation has permitted the inclusion of the TEI variables in the NLSCY, several necessary trade-offs accompany the use of short scales. First, given their brevity (3 items), not all of the EQi:YV-Brief subscales met the desirable Cronbach’s alpha of .70 (alphas were between .60 to .84). However, alpha may not be the most appropriate criterion of internal consistency for such ultra-short scales, since its calculation depends directly on the number of items (Simms & Watson, 2007). Based on the mean inter-item correlations, which are independent of scale length, all four EQi-YV-Brief subscales exhibited moderate to strong levels of internal consistency (r’s = .33 to .65). Moreover, our conclusions about rank-order stability and mean-level change are based on latent-level estimates which are devoid of measurement error. A more consequential trade-off is that the Brief form is invariably limited in the scope of its conceptual coverage, and so its equivalence to the full-length assessment cannot be assumed (Smith, McCarthy, & Anderson, 2000). This means that the validity evidence for the EQi:YV-Brief needs to be accrued independently of the long form, and that findings generated from the NLSCY project, including...
tests of LMI reported here, might not necessarily generalize to the full-length EQi:YV. It will be important to continue the process of construct validation for the EQi:YV-Brief in future studies.

As in all multi-year longitudinal studies (Denham et al., 2009), participant attrition and non-response pose a potential limitation to the generalizability of our results. Our missing data analyses revealed that households that dropped out of the NLSCY had significantly lower income and education levels compared to households that participated in all waves of the current study. This finding is not unique to the NLSCY: indices of lower socioeconomic status (SES) are among the most commonly reported predictors of longitudinal survey non-response (Lepkowski & Couper, 2002; Lillard & Panis, 1998; Radler & Ryff, 2010). No other demographic or TEI variables were associated with longitudinal or cross-sectional missingness in the current sample. Furthermore, all our analyses were weighted by the NLSCY longitudinal survey weights designed to preserve the original population demographics. Therefore, the impact of longitudinal attrition on the current results was likely minimal – a conclusion that is further supported by the null attrition effects found in previous meta-analytic studies of rank-order and mean-level continuity of personality (Roberts et al., 2006; Roberts & DelVecchio, 2000). Nevertheless, follow-up studies building on this work should include SES as a control variable.

In conclusion, our results supported the suitability of three of the four EQi:YV-Brief subscales (Intrapersonal, Interpersonal, and Adaptability) for developmental research focused on making direct comparisons of TEI levels across gender and over time, as long as measurement error and partial non-invariance at age 10-11 are taken into account. However, longitudinal utility of the Stress Management subscale could not be unambiguously confirmed and requires further validation. Although primarily psychometric in nature, results of the current study have far-reaching implications for both applied educational research and basic psychological theory.
Unlike the extensive literature on children’s objective EI abilities, much remains unknown about the developmental dynamics of children’s subjective EI self-concepts – an area that is gaining increasing relevance in educational contexts. Comprehensive in scope and methodological rigour, the NLSCY project is uniquely positioned to answer these questions, and with that knowledge, make a lasting impact on the programs and policies that best support positive development of children and youth. The current study contributes to these efforts by validating the empirical foundations upon which these inferences are made.
References


Chan, D. (1998). The conceptualization and analysis of change over time: An integrative approach incorporating longitudinal mean and covariance structures analysis (LMACS) and multiple indicator latent growth modeling (MLGM). *Organizational Research Methods, 1*, 421-483.


### Table 1

Household Demographic Characteristics for the Study Sample at Cycle 5

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Weighted %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area of residence:</strong></td>
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<tr>
<td>Rural</td>
<td>12.0</td>
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<tr>
<td>Urban, population &lt; 30,000</td>
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<tr>
<td>Urban, population 30,000 to 99,999</td>
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<td>Urban, population 100,000 to 499,999</td>
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<tr>
<td>Urban, population 500,000 or over</td>
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<tr>
<td><strong>Relationship of PMK to the child:</strong></td>
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<tr>
<td>Biological mother</td>
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</tr>
<tr>
<td>Biological father</td>
<td>8.2</td>
</tr>
<tr>
<td>Other</td>
<td>2.0</td>
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<tr>
<td><strong>Age of PMK (years):</strong></td>
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<td>35-39</td>
<td>39.4</td>
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<td>40+</td>
<td>49.1</td>
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<tr>
<td><strong>Age of PMK’s spouse/partner (years):</strong></td>
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<td>35-39</td>
<td>19.9</td>
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<td>40+</td>
<td>56.0</td>
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<td>Not available</td>
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</tr>
<tr>
<td><strong>Highest level of education of PMK:</strong></td>
<td></td>
</tr>
<tr>
<td>Less than secondary</td>
<td>9.9</td>
</tr>
<tr>
<td>Secondary school graduation</td>
<td>27.0</td>
</tr>
<tr>
<td>Beyond high school</td>
<td>12.9</td>
</tr>
<tr>
<td>College or university degree</td>
<td>50.2</td>
</tr>
<tr>
<td><strong>Highest level of education of PMK’s spouse/partner:</strong></td>
<td></td>
</tr>
<tr>
<td>Less than secondary</td>
<td>10.9</td>
</tr>
<tr>
<td>Secondary school graduation</td>
<td>18.9</td>
</tr>
<tr>
<td>Beyond high school</td>
<td>10.8</td>
</tr>
<tr>
<td>College or university degree</td>
<td>36.6</td>
</tr>
<tr>
<td>Not available</td>
<td>22.8</td>
</tr>
<tr>
<td><strong>Household income ($):</strong></td>
<td></td>
</tr>
<tr>
<td>Less than 30,000</td>
<td>3.2</td>
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<tr>
<td>30,000 to 39,999</td>
<td>6.7</td>
</tr>
<tr>
<td>40,000 to 49,999</td>
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<td>50,000 to 59,999</td>
<td>7.1</td>
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<td>60,000 to 79,999</td>
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<tr>
<td>80,000 or more</td>
<td>36.3</td>
</tr>
<tr>
<td>Not available</td>
<td>19.4</td>
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*Note. N = 773. PMK = person most knowledgeable about the child.*
Table 2
The EQi:YV-Brief Items and Their Respective Subscales

<table>
<thead>
<tr>
<th><strong>Intrapersonal items</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RA1. It is easy to tell people how I feel.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RA2. I can talk easily about my feelings.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RA3. I can easily describe my feelings.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Interpersonal items</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ER1. I like doing things for others.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ER2. I feel bad when other people have their feelings hurt.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ER3. I know when people are upset, even when they say nothing.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Stress Management items</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SM1. I get angry easily. (reversed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SM2. I get upset easily. (reversed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SM3. When I get angry, I act without thinking. (reversed)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Adaptability items</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AD1. I can understand hard questions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AD2. I can come up with many ways of answering a hard question when I want to.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AD3. When answering hard questions, I try to think of many solutions.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3

Standardized Estimates of Factor Loadings and Item Reliabilities ($R^2$) from the Cross-Sectional 4-Factor CFA Models

| Item | Age 10-11 (Cycle 5) | | Age 12-13 (Cycle 6) | | Age 14-15 (Cycle 7) | | Age 16-17 (Cycle 8) |
|------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|      | RA      | ER      | SM      | AD      | $R^2$  | RA      | ER      | SM      | AD      | $R^2$  | RA      | ER      | SM      | AD      | $R^2$  |
| RA1  | .68     | .44     | .70     | .49     | .74    | .55     | .78     | .62     |         |        |         |        |        |         |        |        |
| RA2  | .80     | .63     | .92     | .85     | .96    | .91     | .91     | .83     |         |        |         |        |        |         |        |        |
| RA3  | .80     | .64     | .75     | .56     | .73    | .53     | .67     | .45     |         |        |         |        |        |         |        |        |
| ER1  | .68     | .47     | .54     | .29     | .63    | .40     | .57     | .33     |         |        |         |        |        |         |        |        |
| ER2  | .57     | .33     | .60     | .36     | .57    | .32     | .70     | .49     |         |        |         |        |        |         |        |        |
| ER3  | .52     | .27     | .60     | .36     | .53    | .28     | .60     | .36     |         |        |         |        |        |         |        |        |
| SM1  |         |         |         |         |        |         |         |         | .67     | .45     |         |        |        |         |        |
| SM2  | .69     | .48     | .61     | .37     | .46    | .21     | .50     | .25     |         |        |         |        |        |         |        |
| SM3  | .53     | .28     | .56     | .31     | .60    | .36     | .72     | .52     |         |        |         |        |        |         |        |
| AD1  | .66     | .43     | .68     | .46     | .68    | .46     | .67     | .45     |         |        |         |        |        |         |        |
| AD2  | .75     | .57     | .81     | .66     | .81    | .65     | .84     | .70     |         |        |         |        |        |         |        |
| AD3  | .72     | .52     | .68     | .46     | .70    | .49     | .74     | .55     |         |        |         |        |        |         |        |

Correlations:

|      | RA      | ER      | SM      | AD      | RA      | ER      | SM      | AD      | RA      | ER      | SM      | AD      | RA      | ER      | SM      | AD      |
|------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|      | -- .58 -.02$^a$.45 | -- .46 .06$^a$.40 | -- .33 .00$^a$.19 | -- .30 .05$^a$.25 |         |         |         |         |         |         |         |         |         |         |         |         |
| RA   | .43     | -.12    | .50     | .34     | .12 .53 | .25     | .01$^a$.40 | .25     | .16 .13 |         |         |         |         |         |         |         |
| ER   | .01$^a$-.08 -.20 | -.05$^a$.05$^a$ -.06$^a$ | .04$^a$-.06$^a$-.04$^a$ | .05$^a$.06$^a$-.06$^a$ |         |         |         |         |         |         |         |         |         |         |         |
| SM   | .35     | .32 .17 | -- .32 .37 -.03$^a$ | -- .19 .26 .09 | -- .20 .11 -.02$^a$ |         |         |         |         |         |         |         |         |         |

Internal consistency:

<table>
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<tr>
<th></th>
<th>Alpha</th>
<th>MIC</th>
<th></th>
<th>Alpha</th>
<th>MIC</th>
<th></th>
<th>Alpha</th>
<th>MIC</th>
<th></th>
<th>Alpha</th>
<th>MIC</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.79 .60 .66 .75</td>
<td>.83 .60 .73 .76</td>
<td>.84 .60 .69 .77</td>
<td>.83 .65 .74 .79</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RA</td>
<td>.56 .34 .39 .50</td>
<td>.62 .33 .47 .52</td>
<td>.65 .34 .44 .53</td>
<td>.62 .38 .50 .56</td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

Note. $N = 773$. All factor loadings are significant ($p < .05$). Correlations are among subscale scores (below diagonal) and the corresponding CFA factors (above diagonal). RA = Intrapersonal; ER = Interpersonal; SM = Stress Management; AD = Adaptability. Alpha = Cronbach’s alpha coefficient; MIC = mean inter-item correlation. $^a$ Non-significant correlation ($p > .05$).
Table 4

Measurement Parameter Estimates from the Baseline LMACS Models

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor Loadings</th>
<th>Observed Item Means</th>
<th>Residual Variances</th>
<th>Item Reliabilities ($R^2$)</th>
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<tbody>
<tr>
<td></td>
<td>C5</td>
<td>C6</td>
<td>C7</td>
<td>C8</td>
</tr>
<tr>
<td>INTRA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RA1</td>
<td>.67</td>
<td>.70</td>
<td>.76</td>
<td>.79</td>
</tr>
<tr>
<td>RA2</td>
<td>.79</td>
<td>.92</td>
<td>.95</td>
<td>.91</td>
</tr>
<tr>
<td>RA3</td>
<td>.81</td>
<td>.75</td>
<td>.73</td>
<td>.66</td>
</tr>
<tr>
<td>INTER</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ER1</td>
<td>.74*</td>
<td>.48</td>
<td>.49</td>
<td>.55</td>
</tr>
<tr>
<td>ER2</td>
<td>.56</td>
<td>.78</td>
<td>.70</td>
<td>.75</td>
</tr>
<tr>
<td>ER3</td>
<td>.48</td>
<td>.49</td>
<td>.55</td>
<td>.55</td>
</tr>
<tr>
<td>STRES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SM1</td>
<td>.68</td>
<td>.87</td>
<td>.88</td>
<td>.90</td>
</tr>
<tr>
<td>SM2</td>
<td>.67</td>
<td>.66</td>
<td>.47*</td>
<td>.52*</td>
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<tr>
<td>SM3</td>
<td>.54</td>
<td>.56</td>
<td>.67</td>
<td>.70</td>
</tr>
<tr>
<td>ADAPT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AD1</td>
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<td>.67</td>
<td>.64</td>
<td>.65</td>
</tr>
<tr>
<td>AD2</td>
<td>.79</td>
<td>.80</td>
<td>.84</td>
<td>.87</td>
</tr>
<tr>
<td>AD3</td>
<td>.67</td>
<td>.69</td>
<td>.67</td>
<td>.71</td>
</tr>
</tbody>
</table>

Note. $N = 773$. Factor loadings and residual variances are standardized, item means are non-standardized. All parameter estimates are significant ($p < .05$). C5 = Cycle 5 (age 10-11); C6 = Cycle 6 (age 12-13); C7 = Cycle 7 (age 14-15); C8 = Cycle 8 (age 16-17). INTRA = Intrapersonal (residual autocorrelations range -.18 to .36); INTER = Interpersonal (residual autocorrelations range -.02 to .28); STRES = Stress Management (residual autocorrelations range -.11 to .36); ADAPT = Adaptability (residual autocorrelations range -.20 to .41). * Differential item functioning
Table 5

Model-Fit Indices and Nested Model Comparisons from the LMACS Analyses of LMI

<table>
<thead>
<tr>
<th>Nested Invariance Models</th>
<th>df</th>
<th>( \chi^2 )</th>
<th>CFI</th>
<th>Contrast</th>
<th>( \Delta df )</th>
<th>( \Delta \chi^2 )</th>
<th>( \Delta CFI )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intrapersonal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Baseline (unconstrained)</td>
<td>30</td>
<td>102.74*</td>
<td>.983</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>B. A with equal factor loadings</td>
<td>36</td>
<td>141.26*</td>
<td>.975</td>
<td>B vs. A</td>
<td>6</td>
<td>38.52*</td>
<td>-.008</td>
</tr>
<tr>
<td>C. B with equal item intercepts</td>
<td>42</td>
<td>156.68*</td>
<td>.973</td>
<td>C vs. B</td>
<td>6</td>
<td>15.42*</td>
<td>-.002</td>
</tr>
<tr>
<td>D. C with equal factor variances</td>
<td>45</td>
<td>157.72*</td>
<td>.973</td>
<td>D vs. C</td>
<td>3</td>
<td>1.04</td>
<td>-.000</td>
</tr>
<tr>
<td>E. D with equal residual variances</td>
<td>54</td>
<td>256.61*</td>
<td>.953</td>
<td>E vs. D</td>
<td>9</td>
<td>98.89*</td>
<td>-.020*</td>
</tr>
<tr>
<td>E1. E with C5 residual var. free</td>
<td>51</td>
<td>182.00*</td>
<td>.970</td>
<td>E1 vs. D</td>
<td>6</td>
<td>24.28*</td>
<td>-.003</td>
</tr>
<tr>
<td><strong>Interpersonal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Baseline (unconstrained)</td>
<td>30</td>
<td>140.99*</td>
<td>.944</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>B. A with equal factor loadings</td>
<td>36</td>
<td>172.20*</td>
<td>.931</td>
<td>B vs. A</td>
<td>6</td>
<td>31.21*</td>
<td>-.013*</td>
</tr>
<tr>
<td>B1. B with 1 factor loading free</td>
<td>35</td>
<td>144.95*</td>
<td>.944</td>
<td>B1 vs. A</td>
<td>5</td>
<td>3.96</td>
<td>-.000</td>
</tr>
<tr>
<td>C. B1 with equal item intercepts</td>
<td>41</td>
<td>199.16*</td>
<td>.921</td>
<td>C vs. B1</td>
<td>6</td>
<td>54.21*</td>
<td>-.023*</td>
</tr>
<tr>
<td>C1. C with 1 item intercept free</td>
<td>40</td>
<td>168.29*</td>
<td>.936</td>
<td>C1 vs. B1</td>
<td>5</td>
<td>23.34*</td>
<td>-.008</td>
</tr>
<tr>
<td>D. C1 with equal factor variances</td>
<td>43</td>
<td>170.19*</td>
<td>.936</td>
<td>D vs. C1</td>
<td>3</td>
<td>1.90</td>
<td>-.000</td>
</tr>
<tr>
<td>E. D with equal residual variances</td>
<td>52</td>
<td>279.29*</td>
<td>.890</td>
<td>E vs. D</td>
<td>9</td>
<td>109.10*</td>
<td>-.046</td>
</tr>
<tr>
<td>E1. E with C5 residual var. free</td>
<td>49</td>
<td>202.99*</td>
<td>.923</td>
<td>E1 vs. D</td>
<td>6</td>
<td>32.80*</td>
<td>-.013*</td>
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<td><strong>Stress Management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Baseline (unconstrained)</td>
<td>30</td>
<td>129.65*</td>
<td>.964</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>B. A with equal factor loadings</td>
<td>36</td>
<td>183.82*</td>
<td>.947</td>
<td>B vs. A</td>
<td>6</td>
<td>54.17*</td>
<td>-.017*</td>
</tr>
<tr>
<td>B1. B with 1 factor loading free</td>
<td>35</td>
<td>141.58*</td>
<td>.962</td>
<td>B1 vs. A</td>
<td>5</td>
<td>11.93*</td>
<td>-.002</td>
</tr>
<tr>
<td>C. B1 with equal item intercepts</td>
<td>41</td>
<td>175.63*</td>
<td>.952</td>
<td>C vs. B1</td>
<td>6</td>
<td>34.05*</td>
<td>-.010*</td>
</tr>
<tr>
<td>C1. C with 1 item intercept free</td>
<td>40</td>
<td>166.76*</td>
<td>.955</td>
<td>C1 vs. B1</td>
<td>5</td>
<td>25.18*</td>
<td>-.007</td>
</tr>
<tr>
<td>D. C1 with equal factor variances</td>
<td>43</td>
<td>182.02*</td>
<td>.950</td>
<td>D vs. C1</td>
<td>3</td>
<td>15.26*</td>
<td>-.005</td>
</tr>
<tr>
<td>E. D with equal residual variances</td>
<td>52</td>
<td>268.86*</td>
<td>.923</td>
<td>E vs. D</td>
<td>9</td>
<td>86.84*</td>
<td>-.027*</td>
</tr>
<tr>
<td>E1. E with C5 residual var. free</td>
<td>49</td>
<td>216.21*</td>
<td>.940</td>
<td>E1 vs. D</td>
<td>6</td>
<td>34.19*</td>
<td>-.010*</td>
</tr>
<tr>
<td><strong>Adaptability</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Baseline (unconstrained)</td>
<td>30</td>
<td>138.27*</td>
<td>.968</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>B. A with equal factor loadings</td>
<td>36</td>
<td>151.11*</td>
<td>.966</td>
<td>B vs. A</td>
<td>6</td>
<td>12.84*</td>
<td>-.002</td>
</tr>
<tr>
<td>C. B with equal item intercepts</td>
<td>42</td>
<td>278.16*</td>
<td>.934</td>
<td>C vs. B</td>
<td>6</td>
<td>127.05*</td>
<td>-.032*</td>
</tr>
<tr>
<td>C1. C with 1 item intercept free</td>
<td>41</td>
<td>191.22*</td>
<td>.957</td>
<td>C1 vs. B</td>
<td>5</td>
<td>40.11*</td>
<td>-.009</td>
</tr>
<tr>
<td>D. C1 with equal factor variances</td>
<td>44</td>
<td>196.65*</td>
<td>.956</td>
<td>D vs. C1</td>
<td>3</td>
<td>5.43</td>
<td>-.001</td>
</tr>
<tr>
<td>E. D with equal residual variances</td>
<td>53</td>
<td>281.46*</td>
<td>.935</td>
<td>E vs. D</td>
<td>9</td>
<td>84.81*</td>
<td>-.021*</td>
</tr>
<tr>
<td>E1. E with C5 residual var. free</td>
<td>50</td>
<td>239.94*</td>
<td>.946</td>
<td>E1 vs. D</td>
<td>6</td>
<td>43.29*</td>
<td>-.010*</td>
</tr>
</tbody>
</table>

Note. \( N = 773 \). \( \Delta CFI \) = change in comparative fit index values; C5 = Cycle 5 (age 10-11).

* Non-trivial reduction in model fit. \( * p < .05 \)
Table 6

Temporal Stability Coefficients (Autocorrelations) for the EQi:YV-Brief Subscale Scores and their Corresponding LMACS Latent Factors

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Intrapersonal Subscale scores</th>
<th>Interpersonal Subscale scores</th>
<th>Stress Management Subscale scores</th>
<th>Adaptability Subscale scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C5/C6</td>
<td>C6/C7</td>
<td>C7/C8</td>
<td>C5/C7</td>
</tr>
<tr>
<td>Intraperusal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subscale scores</td>
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<td></td>
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<tr>
<td>LMACS models:</td>
<td>Baseline</td>
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<tr>
<td>Baseline</td>
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Note. N = 773. All autocorrelations are significant (p < .05). C5 = Cycle 5 (age 10-11); C6 = Cycle 6 (age 12-13); C7 = Cycle 7 (age 14-15); C8 = Cycle 8 (age 16-17).
Table 7

Cycle-by-Cycle Changes in the EQi:YV-Brief Subscale Scores and the Corresponding LMACS

Latent Factor Means

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Cycle 5 to Cycle 6</th>
<th>Cycle 6 to Cycle 7</th>
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<tr>
<td></td>
<td>$M_{\text{Diff}}$</td>
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<tr>
<td><strong>Intrapersonal</strong></td>
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<tr>
<td>Subscale scores</td>
<td>-0.50</td>
<td>-4.73*</td>
<td>-.17</td>
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<tr>
<td>LMACS models:</td>
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<tr>
<td>Full scalar</td>
<td>-0.21</td>
<td>-4.33*</td>
<td>-.16</td>
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| **Interpersonal**     |                    |                    |                    |
| Subscale scores       | -0.28              | -3.33*             | -.12               | 0.17              | 2.15* | .08 |
| LMACS models:         |                    |                    |                    |                    |      |     |
| Full scalar           | -0.19              | -3.80*             | -.14               | 0.09              | 1.87  | .07 |
| Partial scalar        | -0.08              | -1.20              | -.04               | 0.10              | 1.82  | .07 |

| **Stress Management** |                    |                    |                    |
| Subscale scores       | -0.05              | -0.48              | -.02               | -0.16             | -1.81 | -.07 |
| LMACS models:         |                    |                    |                    |                    |      |     |
| Full scalar           | -0.05              | -0.81              | -.03               | -0.11             | -2.58* | -.09 |
| Partial scalar        | -0.07              | -1.28              | -.05               | -0.14             | -2.53* | -.09 |

| **Adaptability**      |                    |                    |                    |
| Subscale scores       | -0.53              | -6.16*             | -.22               | -0.25             | -2.90* | -.10 |
| LMACS models:         |                    |                    |                    |                    |      |     |
| Full scalar           | -0.27              | -6.06*             | -.22               | -0.14             | -3.11* | -.11 |
| Partial scalar        | -0.14              | -3.00*             | -.11               | -0.14             | -3.07* | -.11 |

*Note. $M_{\text{Diff}}$ = mean difference between adjacent cycles, with positive sign denoting increase over time (subscale scores are on a 0 to 9 scale; LMACS estimates are on a 1 to 4 scale). *a Results for Stress Management may not be interpretable. * $p < .05$
Figure 1. Parameterization of a single-domain longitudinal mean and covariance structures (LMACS) model (Chan, 1998). C5 = Cycle 5 (age 10-11); C6 = Cycle 6 (age 12-13); C7 = Cycle 7 (age 14-15); C8 = Cycle 8 (age 16-17); RA1-3 = Intrapersonal item scores. Estimated model parameters: \( \lambda \) = factor loading; \( \tau \) = item intercept (mean); \( \varepsilon \) = residual (error) variance; \( \mu \) = factor mean; \( \sigma^2 \) = factor variance; \( \sigma \) = factor covariance. In addition, residual covariances between identical items across cycles were freely estimated to account for non-independence of uniquenesses over time (Marsh & Grayson, 1994).
CHAPTER 3

Developmental Dynamics of Trait Emotional Intelligence: A Theoretical Framework and a
6-Year Population Trajectory from Late Childhood to Adolescence

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Manuscript to be submitted for publication in \textit{Journal of Personality and Social Psychology}
Developmental Dynamics of Trait Emotional Intelligence: A Theoretical Framework and a 6-Year Population Trajectory from Late Childhood to Adolescence

Amidst the growing public efforts to promote socioemotional competencies in schools, therapeutic settings, and the workplace (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Nelis et al., 2011; Zijlmans, Embregts, Gerits, Bosman, & Derksen, 2011), emotional intelligence (EI) has emerged as a useful meta-construct in the discourse on positive lifespan development. Formulated in the 1990s (Bar-On, 1997; Salovey & Mayer, 1990), EI encompasses a broad range of objectively assessed abilities (ability EI [AEI]; Mayer, Roberts, & Barsade, 2008) and subjective self-beliefs (trait EI [TEI]; Petrides, 2010) related to the expression, understanding, utilization, and regulation of emotions. The EI theory posits that being proficient (high AEI) and feeling self-efficacious (high TEI) in dealing with one’s own and others’ emotions should greatly facilitate problem solving, goal attainment, resilience, and psychosocial adaptation (Bar-On & Parker, 2000a; Salovey, 2001). Over the past decade, this postulate has received considerable empirical support across a variety of educational, occupational, and health contexts (Brackett, Rivers, & Salovey, 2011; Martins, Ramalho, & Morin, 2010; Stough, Saklofske, & Parker, 2009). Furthermore, comparative studies on AEI and TEI suggest that these two EI components contribute independently, and often in differential ways, to the prediction of substantive outcomes, underscoring their unique and complementary roles in positive development and adaptive functioning (Davis & Humphrey, 2012a,b,c; Qualter, Gardner, Pope, Hutchinson, & Whiteley, 2012; Schutte, Malouff, & Hine, 2011).

As research on EI gains momentum, and socioemotional programs become more and more widespread, so does the need for a comprehensive understanding of the developmental dynamics of various EI components (Durlak et al., 2011). How stable are the individual
differences in EI abilities and self-perceptions, and what processes contribute to their continuity and change over time? What is the normative developmental course of AEI and TEI, and what factors moderate these trajectories? And to what extent are the various EI components structurally integrated and differentiated at different points during development? Answers to these questions are important for supporting educational and intervention efforts aimed at enhancing individuals’ socioemotional resilience. For example, knowing when different aspects of EI are more or less malleable can suggest windows of opportunity during which interventions would be most efficacious. Likewise, knowledge of the normative changes in EI domains can inform more appropriate expectations of what constitutes optimal level of functioning at different ages. These questions are particularly relevant for practitioners working with at-risk individuals (Pellitteri, Dealy, Fasano, & Kugler, 2006) and with youth undergoing salient psychoeducational transitions (Parker, Summerfeldt, Hogan, & Majeski, 2004; Qualter, Whiteley, Hutchinson, & Pope, 2007).

In addition to concrete implications for policy and practice, longitudinal research on the temporal dynamics of EI can reveal novel insights into the basic nature of this multi-faceted construct. To date, the overwhelming majority of EI studies have been conducted with college students and adults. Extending the mainstream EI theory to pre-adult populations is a task that is long overdue (Schaie, 2001) and that is especially needed for the TEI domain (Arsenio, 2003; Mavroveli, Petrides, Shove, & Whitehead, 2008). Whereas the developmental dynamics of AEI have been elaborated in several theoretical writings (Izard, 2001; Lane, 2000; Saarni, 2000), no comparable theories exist for TEI. Moreover, a great deal of insight into the development of children’s emotion-related abilities (AEI) comes from the rich developmental literature that predates the EI construct, which has identified a well-defined trajectory whereby children’s
knowledge and mastery of emotions progress along a continuum of increasing competence, maturity, and sophistication (Denham, 1998; Lane & Schwartz, 1987; Saarni, 1999). In contrast, virtually nothing is currently known about the development of TEI prior to adulthood, with only one longitudinal investigation conducted to date (see Study 1). Using a representative population sample, Study 1 found that over the 6-year span from late childhood (age 10-11) to adolescence (age 16-17), the rank-order stability of individual differences in TEI increased progressively with age – a ubiquitous finding in the differential psychology literature reflecting increasing stabilization of psychological structures with maturation and life experience (Roberts & DelVecchio, 2000). However, the mean-level changes reported in Study 1 were less straightforward and suggested that development of EI self-perceptions might follow a pattern other than the maturity principle that guides the development of AEI (Mayer, Caruso, & Salovey, 1999). That AEI and TEI might each follow a distinct course of development is an intriguing possibility that would shed further light on the unique nature of the two EI components in adulthood. Therefore, not only does this question warrant further investigation, but it also highlights the need for a separate theoretical framework to guide such investigations.

The present study aimed to contribute to both of these objectives. Building on our previous work (Study 1), we constructed and tested a comprehensive latent-growth model of normative changes in TEI from late childhood (age 10-11) to adolescence (age 16-17) using multi-wave data from the National Longitudinal Survey of Children and Youth (NLSCY; Statistics Canada, 2010) – a biannual population survey of Canadian children designed to gather detailed nationally representative information on their long-term development and wellbeing. In the absence of a theoretical developmental account of TEI, we drew on the contemporary self-concept literature (Harter, 2006, 2012; Marsh, 2007; Wigfield & Wagner, 2005) to derive
specific predictions for our study. In the sections that follow, we first outline why it is relevant to consider TEI as a self-concept, by sketching parallels between the definitions of these two constructs and what is known about their function, structure, and organization within the broader personality space. Next, we review literature on the continuity and change of self-concepts from childhood to adolescence and the processes involved in self-concept formation, as a basis for predictions about the developmental properties of TEI. Finally, we present and discuss our results from the NLSCY with respect to the specific predictions of the study.

**TEI as a Self-Concept**

Broadly defined, self-concept represents an individual’s perception of his or her own abilities, attributes, attitudes, and evaluative judgments about the self in a particular domain, be it academic, social, physical, or any other arena of functioning (Jacobs, Bleeker, & Constantino, 2003; Marsh, 2007; Shavelson, Hubner, & Stanton, 1976). As a cognitive construction, self-concept is inherently subjective, in that it captures:

- “how [individuals] construe themselves – what attributes they think they possess,
- what roles they presume they are expected to play, what they believe they are capable of, how they view they fare in comparison with others, and how they judge they are viewed by others” (Bong & Skaalvik, 2003, pp. 1-2).

The same emphasis on subjective construal is prominent in theoretical writings on TEI. Various terms as “emotional self-efficacy”, “emotional self-perceptions”, and “self-perceived abilities” (Mavroveli et al., 2008; Petrides, 2010; Petrides & Furnham, 2001), TEI is assessed with self-report questionnaires about perceived EI competencies (e.g., “I can easily describe my feelings”) and pitted in direct opposition to actual EI abilities. By its very definition, then, TEI represents a person’s self-concept in EI-related domains. Despite this obvious conceptual fit,
there has been very little cross-referencing between the TEI and the self-concept literatures. We see this as a major oversight, as the long-standing tradition of research on the self (James, 1890/1963) has the potential to greatly advance our knowledge about TEI. By using the labels TEI and “EI self-concept” interchangeably, we hope to facilitate the integration of these two kindred yet hitherto disconnected constructs, and in doing so derive novel insights into the nature and development of TEI.

**Regulatory Function**

The central premise of the self-concept theory is that self-concept is not merely a snapshot of one’s abilities and behaviours, but it is an active structure that organizes and gives meaning to past and current experiences, provides goals and standards for behaviour, and motivates future choices and actions (Harter, 2006; Markus & Wurf, 1987). Competence-related cognitions (beliefs, appraisals, expectancies, attributions, evaluations) are considered to be powerful mediators and regulators of achievement behaviour (Bandura, 1997; Dweck, 1999; Eccles & Wigfield, 2002; Ryan & Deci, 2000). Students who hold more positive views of their abilities tend to have a stronger sense of agency over their performance outcomes, approach difficult tasks as challenges rather than threats, put forth more effort and perseverance in the face of setbacks, and ultimately achieve better performance outcomes than students who are less certain about their abilities (Bandura, 1997; Dweck, 1999; Elliot & Dweck, 2005; Kennett & Keefer, 2006). When individuals feel competent in a particular performance area, they also come to see that area as more interesting and personally important over time (Denissen, Zarrett, & Eccles, 2007; Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002; Marsh, Trautwein, Lüdtke, Köller, & Baumert, 2005), develop higher aspirations, and invest more important career choices in that domain (Marsh & Yeung, 1997; Nagy, Trautwein, Köller, Baumert, & Garrett, 2006). The
causal role of positive self-concepts in influencing subsequent achievement over and above prior performance has been demonstrated across multiple performance areas, countries, and settings (Marsh & Martin, 2011; Marsh, Papaioannou, & Theodorakis, 2006; Marsh & Perry, 2005; Valentine, DuBois, & Cooper, 2004).

Analogous to self-perceptions of competence in achievement-related domains, perceptions of one’s ability to understand and navigate the world of emotions (TEI) have emerged as important mediators and regulators of socioemotional functioning above and beyond actual EI abilities (Davis & Humphrey, 2012a,b; Gohm, Corser, & Dalsky, 2005; Martin et al., 2010; Schutte et al., 2011). When faced with real-life challenges or laboratory-induced stressors, individuals who are more confident in their ability to understand and regulate emotions tend to appraise the situation as less threatening and more manageable (Fernández-Berrocal & Extremera, 2006; Mikolajczak & Luminet, 2008; Mikolajczak, Luminet, & Menil, 2006), exhibit healthier physiological responses to stress (Laborde, Brüll, Weber, & Anders, 2011; Mikolajczak, Roy, Luminet, Fillée, & de Timary, 2007), and engage in more proactive and fewer passive or destructive coping practices, which in turn modulate the deleterious effects of stress on performance and wellbeing (Downey, Johnston, Hansen, Birney, & Stough, 2010; Mikolajczak, Menil, & Luminet, 2007; Mikolajczak, Petrides, & Hurry, 2009; Saklofske, Austin, Galloway, & Davidson, 2007). The causal influence of TEI on emotionally intelligent behaviour is further supported by recent experimental evidence, where priming of self-concepts related to successful emotional competence leads to better performance on an objective test of EI abilities than priming of general emotion knowledge, task motivation, or self-directed attention (Schutte & Malouff, 2012). Thus, subjective beliefs in one’s EI capacities appear to be instrumental in motivating and maximizing the effectiveness of emotion regulation efforts, supporting the notion...
that “adaptive coping might be conceptualized as emotional intelligence in action” (Matthews & Zeidner, 2000, p. 460).

Multidimensional Structure

Contemporary self-concept theories are built on the seminal work by Shavelson et al. (1976), who proposed a theoretical self-concept structure which was multi-dimensional (vs. unidimensional) and hierarchically organized. In their model, a global self-concept, representing one’s overall self-evaluation as a competent and worthy person (i.e., self-esteem), was located at the top of the hierarchy and was divided into academic and non-academic domains. These domains were further sub-divided into narrower self-concepts (e.g., verbal and math, social and physical), and so forth. Empirical tests of Shavelson et al.’s model have confirmed the multidimensional structure of self-concept (Byrne & Shavelson, 1996); however, the posited hierarchical organization has not been ubiquitously supported, with a more common finding revealing weak or non-significant inter-correlations among the various self-concept domains (Marsh, 1990). Interestingly, the magnitude of domain inter-correlations, and hence the strength of the hierarchy, appears to vary with age, with self-concepts becoming increasingly more differentiated from one another between childhood and adulthood (Marsh, Craven, & Debus, 1998; Marsh & Shavelson, 1985). Moreover, different self-concept domains tend to relate to various external criteria in highly domain-specific ways, with stronger relationships observed for outcomes most logically related to beliefs in that particular domain (Marsh & Craven, 2006). Not surprisingly, consideration of multiple specific self-concepts offers greater explanatory utility than consideration of a single global self-concept such as self-esteem (Marsh & O’Mara, 2008; Marsh, Parada, & Ayotte, 2004). Based on this evidence, contemporary self-concept theorists
strongly advocate a differentiated multi-dimensional perspective on the internal structure of self-views (Marsh, 2007; Marsh & Craven, 2006).

Within Shavelson et al.’s (1976) theoretical hierarchy, TEI could be located under the non-academic branch, containing several sub-dimensions of its own. The two dominant TEI theories include Bar-On’s (2000) model of emotional-social intelligence, operationalized with the Emotional Quotient Inventory (EQi; Bar-On, 1997), and the TEI theory by Petrides and Furnham (2001; Petrides, 2010), operationalized with the Trait Emotional Intelligence Questionnaire (TEIQue; Petrides, 2009). The EQi assesses self-concepts in four EI domains: Intrapersonal – perceived ability to identify, express, and communicate one’s own emotions; Interpersonal – perceived ability to understand, effect, and empathize with the feelings of others; Stress Management – perceived emotional sensitivity and ability to modulate upsetting emotions; and Adaptability – perceived ability to appraise, problem-solve, and persevere in challenging situations. Similar self-concepts are measured by the TEIQue under the domains of Emotionality, Sociability, and Self-Control. In addition to these EI-specific domains, the EQi and TEIQue, respectively, assess General Mood and Well-Being (overall positive evaluation of one’s current, past, and future self). Akin to self-esteem, General Mood and Well-Being are indices of global self-concepts construed at a higher level of abstraction than the EI-specific domains. Because such generalized self-views tend to be less informative than domain-specific self-concepts (Marsh & Craven, 2006), and because the developmental trajectory of self-esteem has already been charted elsewhere (Block & Robins, 1993; Trzesniewski, Donnellan, & Robins, 2003), the focus of the current study was on the EI-specific self-concepts, which in the NLSCY were assessed with a brief youth version of the EQi (EQi:YV-Brief).
It should be noted that the two TEI assessments (EQ-i and TEIQune) were developed with a hierarchical structure in mind, and the use of sum-total TEI scores continues to be a routine practice in TEI research. Mirroring the broader self-concept literature, however, recent evidence suggests that a global TEI composite cannot adequately capture the full scope of variability in TEI. For example, self-concepts in different EQi domains have been linked with distinct coping strategies: Intrapersonal and Stress Management – with less passive-emotional coping (e.g., rumination, catastrophizing, self-blame); Interpersonal – with greater social support seeking; Adaptability – with more task-focused coping (e.g., problem solving, action planning, positive reappraisal) (Austin, Saklofske, & Mastoras, 2010; Saklofske, Austin, Mastoras, Beaton, & Osborne, 2012). Moreover, the prediction of various criteria tends to be significantly enhanced by including specific TEI dimensions rather than a global TEI score (Gardner & Qualter, 2010; Parker, Keefer, & Wood, 2011). Even more telling is the finding that, despite the same global EQi score, different profiles of perceived strengths and weaknesses within an individual (e.g., high Interpersonal but low Stress Management, or vice versa) have differential implications for long-term real-life outcomes (Keefer, Parker, & Wood, 2012). Lastly, our analyses of the NLSCY data (see Study 1) suggest that, much like self-concepts in other domains (Marsh et al., 1998; Marsh & Shavelson, 1985), EI-specific self-concepts also become increasingly more differentiated with age (the amount of shared variance among the EQi:YV-Brief domains decreased from 26% at age 10-11 to 5% at age 16-17). Taken together, this evidence underscores the importance of adopting a multi-dimensional approach to the study of TEI and its development.
Gendered Nature

The necessity of a multi-dimensional perspective is further illustrated by the observation that null or inconsistent gender differences in global TEI often mask reliable and counter-balancing gender differences in specific TEI domains (Siegling, Vesely, & Saklofske, 2012). Women consistently report higher EI self-concepts in the areas of emotional expressivity, understanding, and empathy (e.g., Intrapersonal and Interpersonal EQi domains), whereas men hold higher EI self-concepts in the areas of emotion regulation, stress tolerance, and self-control (e.g., Stress Management and Adaptability EQi domains) (McIntyre, 2010; Parker et al., 2011; Petrides, 2009; Petrides & Furnham, 2000). These gender differences are evident in the EQi self-reports of children as young as 7 to 9 years old (Bar-On & Parker, 2000b; see also Study 1), and can be traced back to children’s early autobiographical narratives: from a very young age, girls tend to focus more on emotions and relationships, whereas boys tend to place more emphasis on activities and skills when describing themselves (Harter, 2006, 2012). The same conclusions apply to the broader self-concept literature, where small gender differences in global self-esteem (Kling, Hyde, Showers, & Buswell, 1999) conceal larger and contrasting gender differences in specific self-concepts, favouring girls in the verbal and arts domains, and boys in the math and sports domains (Marsh & Craven, 2006). Numerous studies indicate that these gendered patterns of academic self-concepts emerge in the early elementary school years and remain relatively stable from childhood to adulthood (Eccles, Wigfield, Harold, & Blumenfeld, 1993; Jacobs et al., 2002; Marsh, 1989; Marsh & Yeung, 1998).

In explaining these robust gender differences, many developmental psychologists highlight the socializing role of gendered stereotypes and expectations (by parents, peers, teachers, and society at large) in shaping and reinforcing gender differences in children’s
behaviours and self-perceptions (Bussey & Bandura, 1999; Jacobs et al., 2003; Sanchez-Nunez, Fernandez-Berrocal, Montanes, & Latorre, 2008). As children get older, these external stereotypes become internalized into their own sense of self and identity (Harter, 2012). A recent study (Siegling et al., 2012) has mapped EI self-concepts onto aspects of gendered identity, showing that female-typed TEI domains were uniquely associated with stereotypically female traits (e.g., compassion, nurturance, communion), whereas male-typed TEI domains were uniquely associated with stereotypically male traits (e.g., assertiveness, competitiveness, agency). These gendered associations remained significant even after controlling for differences due to biological sex, supporting the social-cognitive nature of TEI. Moreover, a number of researchers have noted that gender differences in TEI do not always reflect gender differences in actual EI abilities (Sanchez-Nunez et al., 2008; Siegling et al., 2012), yet they consistently translate into gender-typed coping behaviours: women’s strategies tend to be more interpersonally oriented (e.g., emotional disclosure, support seeking), whereas men’s strategies tend to be more externally oriented (e.g., problem-solving, distraction) (Brody & Hall, 2000; Ptacek, Smith, & Zanas, 1992).

**Location in Personality Space**

Contemporary integrative theories of personality distinguish between at least two qualitatively distinct yet inter-connected levels, or layers, of personality (McAdams & Pals, 2006; McCrae & Costa 2008; Sheldon, Cheng, & Hilpert, 2011). At the higher-order level, or the core layer, are the most basic and generalized dispositions, such as temperaments and the Big Five traits (Emotional Stability, Extraversion, Conscientiousness, Agreeableness, and Openness to Experience). At the lower-order level, or the surface layer, are the dynamic social-cognitive constructs, such as motives, goals, values, competencies, and attitudes. Core dispositions are
regarded to be more strongly grounded in the genetic and neurobiological differences that are already evident in the first year of life, whereas surface characteristics are thought of as more contextualized and motivated adaptations that begin to take shape in the elementary school years and become integral features of personality by middle childhood (McAdams & Olson, 2010; McCrae & Costa 2008). The two levels/layers of personality are systematically and reciprocally inter-related throughout the lifecourse, in that certain core traits can engender specific goals and motives, and the pursuit of certain goals can bring about particular dispositional tendencies, while both can be influenced by life experiences, social interactions, and broader cultural contexts (Bleidorn et al., 2010; McAdams & Manczak, 2011; Sheldon et al., 2011). Although the two tiers of personality overlap in meaningful and logical ways, they represent distinct and irreducible sources of information about an individual, and their effects on behaviour tend to be both shared/mediated and independent/unique (Albuquerque, de Lima, Matos, & Figueiredo, in press; Roberts, O’Donnell, & Robins, 2004; Sheldon & Hoon, 2007).

Within this multi-level personality space, both TEI (De Raad, 2005; Petrides & Furnham, 2001; Petrides, Pita, & Kokkinaki, 2007) and other domains of self-concept (Marsh, Trautwein, Lüdtke, Köller, & Baumert, 2006) have been empirically situated at the lower levels of the taxonomy, establishing their status as surface-level characteristics. Because personality levels/layers are inter-connected, there is an expected moderate degree of domain-specific overlap between EI self-concepts and the core Big Five dimensions. For example, Intrapersonal self-concept shares unique variance with emotional stability and extraversion; Interpersonal – with extraversion and agreeableness; Stress Management – with emotional stability and agreeableness; and Adaptability – with conscientiousness (Parker et al., 2011). Behavioural genetic evidence suggests that the phenotypic associations between TEI and the Big Five are
attributable primarily to correlated genetic factors and, to a lesser degree, to non-shared environmental factors, with no significant contributions from the shared environment (Vernon, Villani, Schermer, & Petrides, 2008). At the same time, neither EI self-concepts nor self-concepts in other domains are redundant with basic personality and they add significant incremental variance to the prediction of important academic and mental-health outcomes (Davis & Humphrey, 2012c; Di Fabio & Palazzeschi, 2009; Ferrando et al., 2011; Gardner & Qualter, 2010; Parker et al., 2011; Petrides, Pérez-González, & Furnham, 2007; Russo et al., 2012; for evidence on non-EI self-concepts see Marsh, Trautwein, et al., 2006).

In summary, many features that characterize the self-concept construct also apply to TEI, including their regulatory function, multi-dimensional structure, gendered nature, and nomological network. If TEI shares the same properties as other self-concepts, as we propose here, then the same developmental processes implicated in the formation of self-concept should also apply to the developmental dynamics of TEI.

**Developmental Dynamics**

Continuity and change can take on many forms, depending on the specific properties that change (inter-individual differences, structural organization, absolute level, within-person profile) and the level at which change occurs (group vs. individual) (de Fruyt et al., 2006). Two of the most commonly studied forms of change include (a) stability of individual differences (or rank-order continuity) – indicates whether the relative placement of individuals along the trait within a group changes over time; and (b) mean-level change (or normative change) – indicates whether the average level of the trait in a group as a whole changes over time. These two forms of change are independent of each other, in that the same attribute can simultaneously demonstrate both high rank-order stability and significant mean-level change; neither do they
preclude other forms of change (e.g., the presence of individual trajectories that diverge from the group norm). Thus, each type of change answers a different substantive question and is equally informative in the study of lifespan development (Roberts & DelVecchio, 2000; Roberts, Walton, & Viechtbauer, 2006). In fact, many theorists acknowledge that human development is characterized by both continuity and change (Baltes, Staudinger, & Lindenberger, 1999; Caspi, Roberts, & Shiner, 2005; Harter, 2012; Saarni, 1999). At different periods during development normative psychological changes are both enabled and constrained by the maturing neurobiological structures, age-graded life tasks, and social role transitions. These normative processes are further moderated and customized according to individuals’ unique psychological make-up and socialization experiences.

Research on rank-order continuity of personality has established two robust trends that hold for various constructs at different levels/layers of the taxonomy (e.g., core traits, goals, self-concepts). First, test-retest correlations tend to decay over longer time intervals (leveling out in the .20s and .30s), suggesting that individuals’ relative standing on personality dimensions gradually shifts over time (Fraley & Roberts, 2005). At the same time, test-retest correlations also tend to increase with age, from moderate in childhood (.30s and .40s) to high in adulthood (.70s and .80s), indicating that inter-individual differences become increasingly more settled with age (Roberts et al., 2004; Roberts & DelVecchio, 2000). The same trends have been recently replicated for the four EQi:YV-Brief domains (see Study 1), namely the decreasing stability at longer time intervals (from .48 at 2-year retest to .32 at 6-year retest), and the increasing 2-year stability at older ages (from .39 at age 10-11 to .61 at age 16-17). Importantly, these age trends in rank-order consistency cannot be accounted for by differences in measurement reliability or longitudinal survey attrition (Roberts & DelVecchio, 2000).
In contrast to the ubiquitous findings for rank-order continuity, research findings on mean-level change in personality have been much less conclusive. The most consistent trend with respect to the Big Five is that, from middle adolescence to middle adulthood, individuals generally become increasingly more emotionally stable, agreeable, and conscientious with age (Roberts et al., 2006) – a phenomenon that Caspi et al. (2005) termed the “maturity principle”. Accordingly, mean levels of the TEI domains associated with these Big Five traits should also increase during late adolescence and young adulthood – a prediction that has been supported in a 3-year longitudinal study of university students (Parker, Saklofske, Wood, Eastabrook, & Taylor, 2005). However, most attempts to extend the Big Five trajectories into pre-adolescence have garnered little support for the maturity hypothesis, instead producing conflicting results (e.g., de Fruyt et al., 2006; Klimstra, Hale, Raaijmakers, Branje, & Meeus, 2009; Lamb, Chuang, Wessels, Broberg, & Hwang, 2002).

Recently, Soto, John, Gosling, and Potter (2011) suggested that these mixed results may in fact reflect a non-linear trajectory, with changes occurring in the opposite directions during childhood and adolescence. In one of the most comprehensive studies of age differences in the Big Five traits to date (cross-sectional age span 10 to 65 years), Soto et al. demonstrated that emotional stability, agreeableness, and conscientiousness indeed followed a U-shaped age trend, declining between late childhood and early adolescence and then increasing throughout adolescence and young adulthood. The same curvilinear trajectory of mean-level change has been consistently documented in the self-concept literature across multiple academic and non-academic domains (Jacobs et al., 2002; Marsh, 1989; Wigfield, Eccles, MacIver, Reuman, & Midgley, 1991). Although Study 1 found that mean-level changes in the EQi domains were also
suggestive of a non-linear pattern, these analyses were only preliminary, and the non-linearity of the TEI trajectories still remains to be confirmed – the main goal of the current study.

**Self-Concept Formation**

To understand what may account for such normative drop in self-concept at the transition to adolescence, it is useful to remember that self-concepts are social-cognitive constructions that reflect more than one’s objective abilities and past behaviours. Research on the processes involved in self-concept formation has identified several frames of reference, external and internal, against which self-evaluations are made (Marsh, 2007). It is the evolving capacity to utilize these frames of reference – a capacity which unfolds in tandem with the advancement of more complex cognitive and social structures – that contributes to the characteristic U-shaped trend (Harter, 2012).

**Frames of Reference**

**External comparisons.** A mainstay of modern self theories (Harter, 2012), Cooley’s (1902) classic notion of the “looking glass self” emphasizes how the self is a social construction as much as it is a cognitive one. According to this symbolic-interactionist perspective, individuals derive important information about themselves from their impressions of how they are perceived and judged by others (e.g., parents, teachers, peers), known as reflected self-appraisals. These reflected self-appraisals are inferred from interactions with significant others, drawing both on direct feedback about one’s attributes and abilities (e.g., praise, criticism), as well as on more subtle social cues (e.g., behaviours, facial expressions). From this perspective, self-concept represents a cumulative product of one’s personal characteristics and internalized representations of others’ expectations, standards, beliefs, evaluations, and reactions toward the self (Harter, 2012). Interestingly, recent neuroimaging evidence indicates that different
significant others may have differential impact on self-concepts in different domains, such that taking a mother’s perspective had stronger impact on academic self-concept, whereas taking a friend’s perspective had stronger impact on the social self-concept (Pfeifer et al., 2009). The process of reflected self-appraisal is also implicated in the development of gendered selves. For example, parents’ perceptions of their children’s abilities, and their gender stereotypes about abilities, have been consistently linked to children’s own competence self-beliefs in the same gender-stereotyped ways (Eccles, Jacobs, & Harold, 1990; Jacobs & Eccles, 1992).

Social comparison is another powerful source of evaluative information about the self (Harter, 2006; Marsh, 2007). When feedback about one’s abilities is ambiguous or unavailable, individuals will often compare themselves to others in their immediate environment as an alternative frame of reference for estimating how competent they are (Festinger, 1954). A particularly vivid example of social comparison influences on self-concept is the so-called big-fish-little-pond effect, whereby equally able students develop higher academic self-concepts in lower average-ability schools and lower academic self-concepts in higher average-ability schools (Marsh & Hau, 2003; Marsh, Trautwein, Lüdtke, Baumert, & Köller, 2007). Analogous decreases in academic self-concept have been documented for special-needs students after engaging in social comparison with regular classroom students (Renick & Harter, 1989) and for gifted students after participating in a special gifted program with other talented peers (Coleman & Fults, 1982). Thus, individuals may adjust their self-perceptions of ability based on perceived self-contrasts with a salient comparison group. However, social comparison processes can also produce positive influences on self-concept, as in the case of the “reflected glory” effect, whereby one’s self-concept is enhanced by affiliating rather than contrasting with successful others (Marsh, Kong, & Hau, 2000; Tesser, 1988).
**Internal comparisons.** In addition to relying on external frames of reference such as social comparisons and reflected self-appraisals, individuals also engage in comparisons within their internal self-concept structure. One type of internal frame of reference involves temporal comparisons, whereby current self-concepts are evaluated in relation to one’s past achievements and ideal standards for the future self (Harter, 2012; Higgins, 1987). Another internal frame of reference involves dimensional comparisons, when individuals evaluate their competence in one domain on the basis of performance in other domains (Marsh, 2007). As a result of these ipsative processes, higher achievement in one domain (e.g., math) can enhance self-concepts in domains that one views to be related (e.g., physics), but decrease self-concepts in domains that one perceives to be incompatible (e.g., verbal), counteracting the effects of social comparisons and actual performance in those domains. Thus, individuals who see themselves as being especially good at math may conclude that they must not be as good at languages, even if they do well in language classes too.

The dimensional comparison theory has been applied to explain the common finding of the highly differentiated math and verbal self-concepts (near-zero correlations), despite the substantial correlation of the actual school performance in the two domains (Marsh & Hau, 2004; Möller, Pohlmann, Köller, & Marsh, 2009; Möller, Retelsdorf, Köller, & Marsh, 2011). Dimensional comparison processes may also contribute to the “differential distinctiveness” phenomenon, whereby self-concepts in disparate domains tend to become even more differentiated with age, whereas self-concepts in closely related domains tend to become even more integrated with age (Marsh & Ayotte, 2003). The multi-dimensional TEI assessment strategy adopted in the current study allowed us to explore this intriguing possibility.
Normative-Developmental Changes

Harter (2006, 2012) provides a comprehensive account of how developmental advances in children’s cognitive and social structures systematically influence the salience and utilization of different frames of references, producing predictable age-graded changes in self-concept structure, stability, and mean-level trajectory over time.

**Childhood.** Psychological awareness of one’s sense of self (vs. bodily awareness) emerges around age 2-3 years, when children acquire the capacity for language and symbolic thought (Harter, 2006, 2012). During pre-school years, children become increasingly able to think and talk about themselves, although self-descriptions at this age are very concrete, keyed to specific events and activities. The structure of self-narratives is also highly disjointed and compartmentalized, as young children do not yet have the capacity to integrate multiple representations into a coherent self-portrait. Pre-schoolers’ self-evaluations are uniformly and unrealistically positive – a normative inaccuracy attributed to several cognitive limitations characterizing this age period. First, young children lack the perspective-taking ability necessary to engage in social comparisons, yet they routinely perform temporal comparisons in relation to their younger selves. Because most skills improve quite rapidly in childhood, and in the absence of comparative information relative to peers, pre-schoolers genuinely believe in their evident virtuosity. In addition, young children are incapable of recognizing that one can possess both positive and negative attributes at the same time. This all-or-none thinking style further contributes to children’s self-perception of being “all-good”. In terms of reflected self-appraisals, young children are able to anticipate others’ emotional reactions toward themselves, and to recognize explicit social-emotional “scripts”, or rules, for how adults expect them to behave in social situations. However, their overall perspective is still rather egocentric and concrete at this
age. Thus, to the extent that most of the direct feedback children receive from adults is encouraging and positive, their self-descriptions will also reflect those positive views.

Throughout the elementary school years, children’s self-perceptions become progressively more articulated, coordinated, and attuned to others’ feedback. However, self-concepts remain unrealistically positive, owing to the persistence of all-or-none thinking and temporal comparisons with the past self as the dominant frame of reference (Harter, 2006, 2012). It is not until late childhood (age 9-10) that children acquire the higher-order cognitive abilities necessary to form more accurate self-appraisals. Specifically, they become capable of integrating opposing attributes into a more balanced and coherent self-concept. Children’s perspective-taking skills are also sufficiently advanced by this age that they can start inferring more subtle reflected self-appraisals and utilizing social comparison information for self-evaluative purposes. These changes, in turn, promote more realistic but also more negative self-views, as children realize that they may not always be “all-good”, or meet their parents’ expectations, or perform as well as their peers. By late childhood, the social-emotional “scripts” imparted by significant others become fully internalized into children’s own self-guides, and children begin to use more flexible and sophisticated strategies for managing their self-image and behaviour. Older children are also able to think of themselves in terms of generalized traits rather than isolated behaviours, producing more reliable and consistent survey responses; their personality structure also starts to resemble the multi-dimensional, multi-layered structure of adults around this age (McAdams & Olson, 2010; Soto, John, Gosling, & Potter, 2008).

Given the substantial qualitative and structural differences in self-representations of older versus younger children, late childhood (age 10-11) was chosen as the starting point for the TEI trajectory in the current study.
Adolescence. Transition from childhood to adolescence brings about dramatic changes in children’s lives, as they enter puberty, change schools, and adopt new roles and responsibilities. The capacity for abstract thought also develops at this age (12-13 years), resulting in more advanced but also more ambiguous self-concepts (Harter, 2006, 2012). Exposure to new social contexts facilitates greater interpersonal awareness, and with it – heightened sensitivity to social comparisons and reflected self-appraisals, which in turn prompts the adoption of differentiated standards of competence and self-presentation strategies across diverse social domains (e.g., self with peers vs. self with parents). This fragmentation undermines young adolescents’ sense of self-coherence and creates uncertainty and confusion over which of these multiple and often conflicting self-images reflects one’s true self. Preoccupations with both external (self-consciousness) and internal (introspection) comparisons are the hallmarks of this developmental period. As a result of these multiple frame-of-reference effects, young adolescents’ self-concepts can become highly contingent, unstable, and fragile, accompanied by the associated fluctuations in emotional states. Many young adolescents experience further declines in self-concept that coincide with the transition to junior high school. New social reference groups, more stringent academic expectations, ability-based streaming, and greater emphasis on competition by parents and teachers – all of these factors can precipitate self-doubt and re-evaluation of one’s standards of competence.

As adolescents master their new roles and environments, their self-concepts gradually increase throughout mid-adolescence and later adolescent years. However, their self structure can remain fragmented and unstable well into late adolescence (age 17-19), when they acquire advanced cognitive skills to be able to resolve perceived internal contradictions and accept both their strengths and weaknesses as authentic manifestations of the self (Harter, 2006, 2012). Older
adolescents also shift their frame of reference away from social comparisons and reflected self-appraisals, toward their own self-standards that reflect personal values, aspirations, and ideal selves. This allows them to integrate their various self-concepts within a more balanced, intrinsically motivated, and temporally continuous narrative of the self, which is considered to be an important marker of psychosocial maturity (Erikson, 1968).

In summary, Harter’s (2006, 2012) research indicates that the mean-level decline in self-concept between early and late childhood occurs because children’s self-evaluations become more realistic and less over-generalized, whereas the decline from late childhood to early adolescence is attributable to the re-evaluation of one’s standards of competence in relation to multiple new frames of reference. The positive mean-level trend from adolescence to young adulthood is in line with the maturity principle of increasing competence, adaptation, and personal growth. Because these changes are regarded as normative for self development, the same curvilinear trend should generalize to EI self-concepts as well.

**The Present Study**

The objectives of the present study were three-fold: (1) to test the curvilinear trajectory of mean-level changes in specific TEI domains from late childhood (age 10-11) to adolescence (age 16-17); (2) to explore the differential distinctiveness hypothesis among the various TEI domains; and (3) to model gender differences in the domain-specific trajectories and cross-domain differentiation-integration patterns over time. Because previous analyses of the current NLSCY dataset revealed significant effects of socio-economic status (SES) on survey attrition and wave non-response (see Study 1), we also included SES as a covariate in the analyses to see if it moderated the shape of the population trajectory over time.
Analytical Framework

Mean-level change in TEI was analysed using latent growth modeling (LGM), a family of statistical techniques most optimally suited for examining complex multi-wave longitudinal data structures (Duncan & Duncan, 2004). A key advantage of the LGM approach over other, more traditional analyses (e.g., difference scores, repeated-measures analysis of variance) is that it provides estimates of the amount and direction of change not only at the group level, but also for single individuals, which permits simultaneous examination of both the prototypical (mean-level) trajectory and the individual differences in the trajectories over time (Byrne, Lam, & Fielding, 2008). Because LGM falls under the umbrella of structural equation models with mean and covariance structures, it also allows considerable flexibility in the way the variables are specified. The focal attribute at each occasion can be modeled either as a manifest variable, which is a standard practice in LGM applications, or as a latent variable in a multiple-indicator LGM model (MLGM), as was done in the present study. The added advantage of the MLGM design is that the extraneous effects of measurement error, non-independence of indicator residual variances, and various types of measurement non-invariance can be explicitly modeled and controlled (Chan, 1998; Wu, Liu, Gadermann, & Zumbo, 2010).

Consideration of the measurement issues is especially pertinent to the current study, as comparisons of survey responses obtained at different times during development – and the ensuing inferences about change – require that the instrument’s measurement properties remain invariant over time (Marsh & Grayson, 1994). Yet the assumption of full longitudinal measurement invariance is not always tenable in the assessment of developmental constructs (Bates & Novosad, 2005; Denham, Wyatt, Bassett, Echeverria, & Knox, 2009). Indeed, psychometric investigations of various self-report instruments have repeatedly found responses
of children and pre-adolescents to have lower levels of internal consistency and higher prevalence rates of satisficing response styles (e.g., social desirability, acquiescence) than self-reports of adolescents and adults (Borgers, de Leeuw, & Hox, 2000; Parker, Eastabrook, Keefer, & Wood, 2010; Soto et al., 2008). Different degrees of measurement non-invariance have also been documented for the four EQi:YV-Brief subscales used in the NLSCY (see Study 1). The Intrapersonal, Interpersonal, and Adaptability subscales showed partial non-invariance, whereby children’s responses at age 10-11 were less reliable and disproportionately more positive on selected items than their subsequent responses at ages 12-13 through 17-18. However, partial non-invariance on these subscales could be effectively controlled. In contrast, the Stress Management subscale produced systematic non-equivalencies in item functioning that precluded meaningful comparisons of item responses over time. Accordingly, only the former three EQi:YV-Brief subscales were included in the current study, and partial non-invariance of their measurement properties was explicitly modeled using the MLGM design.

The key parameters of interest in an MLGM model are the means and variances of two higher-order growth factors representing the initial level (intercept) and the rate of change (slope) in the latent attribute over time. This basic two-factor model can be further extended to test a variety of specific predictions about change. In the present study, this was done in four sequential steps: (1) for each TEI domain, a third growth factor (quadratic slope) was added to the MLGM – this allowed us to test whether the normative developmental trajectory was curvilinear or linear in shape; (2) trajectories for the three TEI domains were joined together in a correlated multi-domain MLGM – to estimate the extent to which their development was associated or differentiated over time; (3) multiple-group MLGMs were fitted to the male and female data simultaneously – to evaluate whether gender moderated the initial levels and
changes in TEI over time; and (4) the SES variable was added as a predictor of the growth factors in a conditional MLGM – to examine its potential confounding effects on the results.

**Study Hypotheses**

In line with Harter’s (2006, 2012) developmental theory and empirical findings of curvilinear age trends in personality and self-concepts (Jacobs et al., 2002; Marsh, 1989; Soto et al., 2011), we predicted that a non-linear, quadratic mean-level trajectory of growth would provide the best fit for all three TEI domains (Hypothesis 1; H1). Consistent with the robust pattern of gender differences on the EQi (Bar-On & Parker, 2000b; Parker et al., 2011), girls were expected to have significantly higher Intrapersonal and Interpersonal intercept factor means, whereas boys were expected to have a significantly higher Adaptability intercept factor mean (Hypothesis 2; H2). Based on our previous findings in this sample (see Study 1) and other literature documenting continuity of the gender gap in self-concepts over time (Bar-On & Parker, 2000b; Jacobs et al., 2002; Marsh & Yeung, 1998), we predicted that gender differences on the three TEI domains would persist over time (Hypothesis 3; H3). The intercept factors of the three TEI domains were expected to be positively inter-correlated (Hypothesis 4; H4). As for the slope factors, we allowed that some slope factors would remain correlated across domains, whereas others would become un-correlated (i.e., differentiated distinctiveness; Marsh & Ayotte, 2003) (Hypothesis 5; H5). Additional research questions (with no specific hypotheses) involved exploring the moderating effects of SES on the growth trajectories.

**Method**

**Data Source**

Data for this study were drawn from several cycles of the original longitudinal cohort of the NLSCY. The study of this cohort began with a stratified probability sample of almost 23,000
children selected to represent the civilian population of all Canadian children who were 0 to 11 years old at the time of Cycle 1 data collection (1994), excluding residents of northern territories, children living on First Nations reserves, and children living in institutions (approx. 2% of the population). Subsequent data on these children were collected every two years, but the sample was truncated to about 16,000 children in Cycle 2 due to budgetary constraints and to reduce response burden on families with multiple children. About 10,000 of these children participated in the last cycle of the survey (Cycle 8 in 2008).

The NLSCY data relevant to the current study were collected in the context of a household. That is, at each cycle, persons most knowledgeable (PMK) about the child (the child’s mother in 90% of cases) provided information about themselves, the child, and other family members in a face-to-face or telephone interview administered by a trained Statistics Canada interviewer using computer-assisted interviewing. In addition, children aged 10 years and older were asked (with consent from the PMK) to complete a self-report questionnaire booklet in a private setting at home and return their responses in a sealed envelope. Further details about the NLSCY sampling design and data collection procedures can be found in the latest NLSCY data User Guide (Statistics Canada, 2010).

**Study Sample**

The current study utilized data for a subsample of children who were 10 to 11 years old in Cycle 5 (2002) and subsequently became 12 to 13 years old in Cycle 6 (2004), 14 to 15 in Cycle 7 (2006), and 16 to 17 in Cycle 8 (2008). Analyses were restricted to this particular age cohort due to the NLSCY’s age-specific assessment strategy: for children under the age of 10 no TEI measure (or any other self-complete scale) was administered, whereas youth aged 18 years and older completed adult versions of the scales. Therefore, only the subsample that completed
the same TEI measure (EQi:YV-Brief) at all four cycles was selected for this study, to ensure comparability of their scores over time.

The sample used in the analyses comprised 773 children (50.9% girls, 93.1% White). At the time of their first TEI assessment (Cycle 5), the majority of these children (80.4%) lived in a two-parent household. The household demographic characteristics are described in Table 1.

INSERT TABLE 1 HERE

Missing Data

Following the NLSCY guidelines (Statistics Canada, 2010) and general recommendations for longitudinal research (Jeličić, Phelps, & Lerner, 2009), two types of missing data were considered: (1) total non-response, representing cycle-wide absence of the EQi:YV-Brief data and survey attrition (due to participant unavailability, deaths, relocations, changes in inclusion rules, etc.); and (2) partial non-response, representing missing responses on one or several EQi:YV-Brief items. Of the total cohort of 10- to 11-year-olds who participated in the NLSCY at Cycle 5 (the focus of the current study), data for the EQi:YV-Brief were available for 82.8% at Cycle 5; 78.9% at Cycle 6; 74.3% at Cycle 7; and 62.1% at Cycle 8. Because participation in each preceding cycle was not required to participate in subsequent cycles, the proportion of children who responded to the EQi:YV-Brief at all four cycles was somewhat lower (52.6%). The extent of partial item non-response was very small at each cycle: 10.8% of the EQi:YV-Brief protocols at Cycle 5; 3.8% at Cycle 6; 2.4% at Cycle 7; and 2.1% at Cycle 8.

In the NLSCY, cycle-by-cycle survey attrition can be taken into account via longitudinal sampling weights provided with the NLSCY datafiles for each record (Statistics Canada, 2010). The NLSCY weights are adjusted for survey-wide non-response and post-stratified to known counts by age, sex, and province to reflect the original survey population. Accordingly,
longitudinal survey weights were applied in all analyses of the current study, thereby ensuring that the results remained representative of the population demographics and less biased by total non-response. Because inclusion of the longitudinal item-level measurement model for the EQi:YV-Brief was an important element of the current study, we were reluctant to impute missing EQi:YV-Brief data for participants who did not provide at least partial EQi:YV-Brief responses at each cycle. Compared to participants with available data at all four cycles, participants who were excluded due to cycle-wide non-response came from households with significantly lower ($p < .05$) income level, and their PMK and the PMK’s spouse/partner had significantly lower ($p < .05$) levels of education (no other demographic variables and none of the available EQi:YV-Brief scale scores were significantly associated with exclusion due to total non-response). To account for the potential confounding effects of participants’ socio-economic background, a composite SES index was included as a covariate in the present study. The impact of partial EQi:YV-Brief item non-response in the current dataset was evaluated elsewhere (see Study 1) and was found to be inconsequential. Therefore, analyses based on cases with complete data ($N = 773$), weighted for longitudinal non-response, are reported in the main results.

**Measures**

**TEI.** Participants’ TEI at Cycles 5, 6, 7, and 8 was assessed with a brief form of Bar-On and Parker’s (2000b) Emotional Quotient Youth Version (EQi:YV-Brief). The Brief form, which was administered to the NLSCY respondents aged 10 to 17 years as part of the Self-Complete Questionnaire, assesses the same four TEI domains as the full-length scale (3 items each): Intrapersonal (INTRA, e.g., “I can easily describe my feelings”), Interpersonal (INTER, e.g., “I feel bad when other people have their feelings hurt”), Stress Management (STRES, e.g., “When I get angry, I act without thinking”, reverse-keyed), and Adaptability (ADAP, e.g., “When
answering hard questions, I try to think of many solutions”). The items are rated on a 4-point scale ranging from 1 (rarely true of me) to 4 (very often true of me). Response category values are reversed for the 3 STRES items, such that higher scores represent more positive perceptions of one’s competence. Previous analyses of the EQi:YV-Brief in the current NLSCY cohort (see Study 1) indicated that the four-factor structure of the EQi:YV-Brief was relatively invariant across Cycles 5 through 8, and that latent-factor means on the INTRA, INTER, and ADAP subscales (but not STRES) were comparable between genders and over time. The STRES subscale was not included in the current study.

**SES.** The household’s relative socioeconomic standing was indexed with a composite variable included in the NLSCY datafiles and derived from three sources of information: (1) years of education of the PMK and the PMK’s spouse/partner, each coded on an 8-point scale from 1 (no schooling) to 8 (MD/PhD); (2) household income, coded in thousands of dollars; and (3) occupational prestige of the PMK and the PMK’s spouse/partner, each ranked on the Pineo’s 16-category scale, from 1 (least prestigious, unskilled) to 16 (most prestigious, professional), and transformed to the logit distribution (Statistics Canada, 1996). Each constituent variable was standardized on the entire sample of households to have a mean of 0 and a standard deviation of 1, and the SES composite was then calculated by averaging these z-scores ($M = 0.02$, $SD = 0.78$ in the current sample). The SES variable used in the current study was based on Cycle 3 data (this index was not available at later cycles).

**Statistical Analyses**

The analyses were conducted in four stages. Stage 1: A set of unconditional single-domain MLGMs was first estimated separately for each of the three EQi:YV-Brief domains

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1 A copy of the full NLSCY questionnaire is enclosed in Appendix A.
(INTRA, INTER, ADAP), to establish their most optimal form of growth and the significance of their growth parameters. Three forms of growth were investigated: zero growth (intercept factor only), linear growth (intercept and linear slope factors), and quadratic growth (intercept, linear slope, and quadratic slope factors). The intercept coefficients were fixed to 1 across all factors; the linear slope coefficients were fixed to 0, -1, -2, -3; and the quadratic slope coefficients were fixed to 0, 1, 4, 9. Consequently, the intercept mean represented the initial meal level of TEI at age 10-11; the linear slope mean represented the amount of immediate decrease in mean TEI from age 10-11 to 12-13; and the quadratic slope mean represented the degree of subsequent deceleration and increase in mean TEI from age 12-13 onwards. The growth factor variances represented the amounts of inter-individual variability in the initial levels, rates of immediate decrease, and rates of subsequent deceleration and increase, accordingly (see Figure 1 for full parameterization of the MLGM model).

MODEL FIT

Model fit was evaluated based on the root-mean-square error of approximation (RMSEA) and its 90% confidence interval (90% CI), with RMSEA ≤ .08 and RMSEA ≤ .05 indicating acceptable fit and good fit, respectively (Browne & Cudeck, 1993; Hu & Bentler, 1999). The more complex MLGM shape was chosen over the simpler one if it added a significant latent growth parameter (mean, variance, or both) and if it provided a significant improvement in fit.

2 Other commonly used fit indices, such as the standardized root-mean-square residual (SRMR) and the comparative fit index (CFI), perform sub-optimally in detecting misspecification in LGM analyses (Wu, West, & Taylor, 2009). In the current study, these indices failed to differentiate among the various models tested: every model had acceptable values (SRMR ≤ .08, CFI ≥ .95).
without compromising model parsimony, as indexed by smaller RMSEA values and smaller Akaike Information Criterion (AIC) values.

Stage 2: Next, the best-fitting growth trajectories for INTRA, INTER, and ADAP were modeled simultaneously in a correlated multi-domain MLGM, to examine the associations between growth factors and the degree of differentiation in the growth trajectories. This multi-domain MLGM included all of the parameters from the single-domain MLGMS, plus all cross-domain correlations among the growth factors (primary parameters of interest in this analysis), as well as the same-cycle correlations among the first-order factor residuals. The latter set of parameters was necessary to account for occasion-specific variance shared across the domains.

Stage 3: To examine whether gender moderated the INTRA, INTER, and ADAP trajectories, a set of unconditional single-domain MLGMs was first estimated separately in the male and female groups, to determine the best-fitting shape of growth in each group. Gender differences in the growth factor parameters were tested by estimating the best-fitting growth trajectories for each domain in a multiple-group MLGM framework, and then constraining each growth factor parameter to be equal between the two groups. A significant chi-square change value associated with the constrained parameter indicated significant gender difference. Gender differences in cross-domain associations among the growth trajectories were examined in a correlated multiple-group multi-domain MLGM.

Stage 4: Lastly, to test whether SES moderated the TEI trajectories, the growth factors for INTRA, INTER, and ADAP were regressed onto the SES indicator in a conditional multiple-group multiple-domain MLGM. A significant intercept but not slope regression path would indicate that the SES effect was constant and did not change over time. A significant slope but not intercept regression path would indicate that the trajectories started at the same level but
diverged over time depending on the level of SES. Significant regression paths to both the intercept and the slope factors would indicate different starting points and divergent (or convergent) trajectories over time depending on the level of SES.

The measurement portion of the MLGMs for each EQi:YV-Brief domain was specified according to the best-fitting scalar invariance model derived in Study 1 (INTRA: full scalar invariance; INTER: partial scalar invariance with free ER1 factor loading and free ER1 item intercept at Cycle 5; ADAP: partial scalar invariance with free AD3 item intercept at Cycle 5). Model identification and scaling in the current study was based on the effects-coding method described by Little, Slegers, and Card (2006). In contrast to the traditional marker-indicator method, which constrains one factor loading to 1 and one item intercept to 0 on each factor, the effects-coding method constrains the average of factor loadings to 1 and the sum of item intercepts to 0 on each factor. This ensures that the estimates of factor variances and factor means are optimally weighted by the degree to which each item represents its underlying latent construct, rather than based on the metric of one arbitrarily chosen item (Little et al., 2006).

All models were tested with EQS 6.1 for Windows structural equation modeling software (Bentler, 2005) using weighted correlation matrices with means and standard deviations (generated with SPSS 19) as model inputs. Examination of the variable distributions revealed no univariate or multivariate outliers that were significantly disconnected from the distributions’ tails, and the variables presented no problems of normality, with skewness ranging from -.93 to .26 and kurtosis ranging from -1.0 to .10. Therefore, maximum-likelihood estimation procedure was implemented for all models.
Results

Normative Trajectories

Model fit results for the single-domain MLGMs are presented in Table 2. For all three TEI domains, zero-growth models had the worst fit and quadratic-growth models had the best fit to the data. The quadratic-growth models provided significant improvement in fit over the linear-growth models without compromising model parsimony (lowest RMSEA and AIC values), with particularly large gains in fit for ADAP, $\Delta \chi^2(3) = 49.35, p < .001$, and for INTRA, $\Delta \chi^2(4) = 28.74, p < .001$, but less so for INTER, $\Delta \chi^2(1) = 6.28, p < .01$. For INTRA and ADAPT, both the mean and the variance of the quadratic slope factor were significant, whereas only the quadratic slope factor mean was significant for INTER. Based on these significant results, the quadratic-growth trajectories were selected as the best-fitting representations of normative changes in the three TEI domains over time.

INSERT TABLE 2 HERE

Non-standardized parameter estimates from the quadratic-growth models are presented in Table 3. For INTRA and ADAP, children’s self-perceptions decreased, on average, from age 10-11 to age 12-13 (significant linear slope means), but the average rate of change slowed down between the ages of 12-13 and 14-15 and eventually reversed direction towards gradual increase between the ages of 14-15 and 16-17 (significant quadratic slope means). For INTER, children’s self-perceptions remained unchanged, on average, between the ages of 10-11 and 12-13 (non-significant linear slope mean), but subsequently increased from age 12-13 onward, with the average rate of change accelerating with age (significant quadratic slope mean). These mean-level trajectories are depicted graphically in Figure 2.

INSERT TABLE 3 AND FIGURE 2 HERE
There was significant inter-individual variability around the mean-level trajectories, both in the initial levels (significant intercept variances) and in the rates of change over time (significant linear and quadratic slope variances). For example, although in the sample as a whole the linear slope means indicated a decreasing mean-level trajectory for INTRA and ADAP and a stable mean-level trajectory for INTER between the ages of 10-11 and 12-13, individual growth trajectories included both positive and negative linear slopes (±1 SD values ranged from - .43 to .71 for INTRA, -.10 to .18 for INTER, and -.39 to .73 for ADAP, where negative values denote increase in TEI). Thus, some children experienced a decrease whereas other children experienced an increase in their individual TEI levels from age 10-11 to age 12-13. The finding of significant growth factor variances allows examining the associations among individual differences in the initial levels and rates of change over time, as well as testing for potential moderating effects of gender and SES on the TEI trajectories.

**Correlated Development**

The correlated multi-domain MLGM provided acceptable fit to the data, $\chi^2(531) = 1971.87$, RMSEA (90% CI) = .059 (.057, .062). Standardized inter-correlations among the growth factors for the three TEI domains are reported in Table 4. Several trends are apparent from these associations. First, the intercepts of all three TEI domains were significantly and positively inter-correlated ($r = .61$ to .69), suggesting that at age 10-11, children who held positive self-concepts in one TEI domain also tended to view themselves positively in all other TEI domains. Second, the linear slope factors for INTER and ADAPT were significantly and positively correlated ($r = .49$), such that children who experienced a stronger decrease in ADAP between the ages of 10-11 and 12-13 also experienced a stronger decrease in INTER in that time period, and vice versa. However, the correlation between their linear and quadratic slope factors
was non-significant ($r = .24, ns$), indicating that INTER and ADAP self-perceptions became more differentiated in later adolescence. Finally, neither the linear nor the quadratic slope factors of INTRA were significantly correlated with the slope factors of the other two domains ($r = -.19$ to $.22, ns$), indicating that individuals’ self-perceptions of INTRA became differentiated from those of INTER and ADAP after the age of 10-11.

INSERT TABLE 4 HERE

**Moderating Effects of Gender**

To examine whether gender moderated the mean-level TEI trajectories, we first estimated all MLGMs separately for boys and girls to determine the best-fitting shape in each gender group. In the male group, the quadratic-growth models provided significant improvement in fit over the linear-growth models, without compromising model parsimony, for all three TEI domains: $\Delta \chi^2(4) = 17.30, p < .01$ for INTRA, $\Delta \chi^2(2) = 25.31, p < .001$ for INTER, and $\Delta \chi^2(3) = 26.60, p < .001$ for ADAP. In the female group, the quadratic-growth models were likewise supported for INTRA, $\Delta \chi^2(3) = 16.29, p < .001$, and for ADAP, $\Delta \chi^2(2) = 29.20, p < .001$, indicating that the basic shapes of the mean-level trajectories in these two domains were comparable between boys and girls. For INTER, however, the quadratic-growth model provided no significant improvement in fit over the linear-growth model among girls, $\Delta \chi^2(1) = 2.10, p = .15$, and none of the quadratic slope factor parameters were significant; moreover, the linear-growth model was associated with the lowest parsimony indices among girls. Therefore, gender moderated the basic shape of the mean-level trajectory for INTER, which was U-shaped for boys but linearly increasing for girls (see Figure 3).

INSERT FIGURE 3 HERE

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3 Full model-fit results are enclosed in Appendix C.
Gender differences in the growth factor parameters were tested in a multiple-group MLGM framework (results summarized in Table 5). The largest gender effects for all three TEI domains were associated with the intercept factor means. At age 10-11, girls had significantly higher INTRA and INTER mean levels than boys, whereas boys had significantly higher ADAP mean levels than girls. As depicted in Figure 2, these initial gender differences remained consistent throughout the whole study period for INTRA and ADAP (equal linear and quadratic slope means) and became even more pronounced for INTER (linear slope means in the opposite direction). There were also significant gender differences in the growth factor variances for INTRA and especially INTER, but not ADAP. Girls evidenced significantly less variability in the initial levels for INTRA and INTER, and for INTER also in the rates of change over time. The reduced variability in INTER among girls, coupled with their substantially higher INTER mean levels and an increasing trend over time, point to a potential ceiling effect in the assessment of INTER among girls, particularly at older ages.

To examine whether gender moderated cross-domain associations among the TEI trajectories, the single-domain multiple-group MLGMs were joined in a correlated multi-domain MLGM, $\chi^2(1074) = 3457.95$, RMSEA (90% CI) = .054 (.052, .056). As in the full sample, the intercepts of all three TEI domains were significantly and positively inter-correlated for both boys ($r = .60$ to $.75$) and girls ($r = .53$ to $.96$). Also as in the full sample, changes in the INTER and ADAP self-perceptions between the ages of 10-11 and 12-13 were moderately associated for both boys and girls, as evidenced by their positively correlated linear slope factors ($r = .38$ and $.57$, respectively). For girls, correlated development between INTER and ADAP persisted into later adolescence, based on the significant cross-domain correlation of the linear and quadratic
slopes ($r = .46$), whereas for boys the INTER and ADAP self-perceptions became more differentiated in later adolescence ($r = .12$, $ns$). The joint trajectories of INTRA with the other two domains also showed differential patterns of associations in the male and female groups. The INTRA and INTER trajectories were strongly and positively correlated for boys, both in terms of their linear ($r = .77$) and quadratic slope factors ($r = .99$), whereas for girls neither the linear ($r = -.08$, $ns$) nor the quadratic slope factors ($r = -.30$, $ns$) were significantly correlated, suggesting that girls’ self-perceptions of INTRA and INTER became differentiated after the age of 10-11. An opposite gender trend was evident for the INTRA and ADAP trajectories, which were more strongly correlated for girls than for boys, both in terms of their linear ($r = .59$ vs. .37) and quadratic slope factors ($r = .50$ vs. .37).

**Moderating Effects of SES**

To test whether SES moderated the mean-level TEI trajectories, the growth factors of the three TEI domains were regressed onto the SES indicator in a conditional multiple-group multiple-domain MLGM, $\chi^2(1130) = 3697.72$, RMSEA (90% CI) = .054 (.052, .056).

Standardized regression coefficients from this model are presented in Table 6. The largest SES effects in both gender groups (8-12% of variance) were associated with the intercepts and linear slopes of the INTER trajectory. At age 10-11, children from higher-SES households held significantly higher INTER self-perceptions, on average, than children from lower-SES households (significant intercept effects). However, this difference was significantly reduced between the ages of 10-11 and 12-13, as children from lower-SES households experienced slower decreases (for boys) or faster increases (for girls) in their INTER levels during this period, compared to children from higher-SES households (significant linear slope effects). As a

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4 Full correlation table is enclosed in Appendix C.
result, the SES difference observed at age 10-11 was no longer evident at ages 14-15 and 16-17 (see Figure 4). The only other factor affected by SES was the ADAP intercept, such that higher SES was associated with slightly higher ADAP self-perceptions at all ages. However, this effect was rather small (less than 3% of variance) and reached significance for boys only. Constraining all regression paths to be equal in the two gender groups did not result in significant deterioration of model fit, $\Delta \chi^2(9) = 12.56, p = .18$, indicating that the effects of SES on the TEI trajectories were equivalent for boys and girls. Controlling for the effects of SES did not alter the patterns of inter-correlations among the three TEI trajectories in either gender group.

**Discussion**

Despite the growing application of emotional intelligence (EI) in diverse educational, organizational, and health settings, research on the developmental dynamics of this multi-faceted construct remains heavily weighted by the ability EI (AEI) perspective, whereas trait EI (TEI) has received virtually no attention in the developmental literature (Arsenio, 2003; Mavroveli et al., 2008; but see Study 1). This is a significant oversight, as the two EI components tend to contribute independently, and often in differential ways, to the prediction of substantive outcomes (Davis & Humphrey, 2012a,b,c; Qualter et al., 2012; Schutte et al., 2011). The current study represents the first systematic attempt to chart the normative developmental course of TEI in a longitudinal population sample followed biannually from late childhood (age 10-11) to adolescence (age 16-17).

**Normative Trajectory**

The most noteworthy finding of our study is the curvilinear TEI trajectory characterized by a reversal in the direction of mean-level change between late childhood and adolescence.
(support for H1). Specifically, the Intrapersonal and Adaptability levels declined, on average, from age 10-11 to age 12-13, leveled out between the ages of 12-13 and 14-15, and then began to increase again from age 14-15 onward. The Interpersonal level remained relatively unchanged, on average, between the ages of 10-11 and 12-13, and then increased exponentially from age 12-13 onward. This curvilinear trajectory is in stark contrast to the maturity principle of AEI development (Mayer et al., 1999), whereby older children and pre-adolescents consistently outperform younger children, and are in turn outperformed by adolescents and adults on a variety of emotion ability tasks (Saarni, 1999). Thus, at least at some periods during development, normative changes in EI self-perceptions appear to be disconnected from normative changes in EI abilities. From an applied standpoint, this implies that enhancing EI abilities alone may not necessarily result in concomitant increases in EI self-concepts, and vice versa. Instead, both AEI and TEI may need to be targeted to maximize the effectiveness of intervention efforts.

To understand the developmental nature of TEI, a key theoretical proposition put forth in the current study was that changes in TEI would follow the same principles that characterize the development of other self-concepts, influenced by various internal and external frames of reference which become more or less salient at different periods during development (Harter, 2006, 2012; Marsh, 2007). Although we did not assess these processes directly, they are necessarily implied in the curvilinear trajectory we observed for TEI, which is remarkably consistent with the developmental course of children’s self-perceptions in other personality and performance domains (Jacobs et al., 2002; Marsh, 1989; Soto et al., 2011; Wigfield et al., 1991). These findings provide, for the first time, important validity evidence for the TEI construct as developmentally similar to the self-concept construct. Connecting TEI to the self-concept
literature, in turn, suggests novel insights into the nature of the observed decrease in mean TEI levels at the transition to adolescence.

Transition to adolescence brings about a number of rapid changes (e.g., onset of puberty, move to high school, increased autonomy), which are often accompanied by heightened emotional sensitivity, impulsivity, and conflict (Somerville, Jones, & Casey, 2010; Steinberg & Morris, 2001). In the face of such stressors, young adolescents may conclude that their previously successful coping strategies are no longer adequate to adapt to new demands, prompting them to raise their standards for what constitutes high EI and lower their self-evaluations accordingly (temporal comparisons). Parental worry over young adolescents’ safety during their increasingly independent endeavours may be another source of negative feedback about one’s ability to handle life demands (reflected self-appraisals). Adolescents are also highly self-conscious about their standing in relation to peers, engaging in frequent self-reflection and social comparisons (Harter, 2012). Increased attention to one’s own emotions may heighten the intensity of the subjective emotional experience, which may in turn lower adolescents’ perceived sense of mastery over their emotions (Gohm & Clore, 2002). These perceptions of incompetence may be amplified when contrasted with the (outwardly) less intense experiences of peers.

That competence self-perceptions in other domains (e.g., social, academic, physical) also tend to decline from childhood to early adolescence implies that these changes are normative – a general re-calibration of competence standards to reflect roles, expectations, and life experiences that are increasingly less child-like and more adult-like (Harter, 2006, 2012; Jacobs et al., 2003). The observed gradual increase in TEI and other self-concept domains later in adolescence reflects youths’ growing ability to meet these new standards, in line with the maturity principle characterizing the development of AEI (Mayer et al., 1999; Saarni, 1999) and the Big Five
dimensions of personality (Caspi et al., 2005; Roberts et al., 2006). In future studies, it will be important to track normative year-by-year changes in TEI beyond adolescence and into young adulthood – an important period for identity and personality formation that marks the beginning of a coherent life-long narrative about the self (Arnett, 2000; Erikson, 1968; Harter, 2012). Based on the maturity principle, we should see further pronounced increases in mean TEI levels during late adolescence and early adulthood, and there is already some cross-sectional (Tsaousis & Kazi, 2013) and longitudinal (Parker et al., 2005) evidence to support this prediction.

Although it would be equally informative to extend the TEI trajectory back into early and middle childhood, this task is more challenging methodologically. This is because measurement of developmental change requires that the structure and quality of the assessment remain invariant over time (Bates & Novosad, 2005; Denham et al., 2009). Whereas the assumption of measurement invariance of the EQi:YV-Brief has been previously confirmed for the age period covered in the present study (see Study 1), it may not hold for children much younger than age 8-10, given the substantial qualitative differences in the very nature and structure of their self-concepts (Harter, 2006, 2012). Therefore, a different TEI measure may be required for younger children. This caveat notwithstanding, we should see even higher mean TEI levels in younger children, in light of their prevailing temporal comparisons with younger selves, all-or-none thinking style, and under-developed perspective-taking skills – all of which contribute to unrealistically positive self-views (Harter, 2006, 2012).

**Moderators of Change**

Although the main focus of the present study was on the normative developmental course of TEI at the population level, employing latent growth modeling techniques also allowed us to explore individual differences in the patterns of change over time. For all three TEI domains, we
found significant variability around the population mean not only in the initial levels, but also in the rates of change over time, suggesting that not all children experienced a decline in their EI self-concepts at the transition to adolescence. Therefore, a systematic investigation of the predictors of individual differences in change is also necessary for a full understanding of TEI’s developmental dynamics. To this end, we examined gender and socioeconomic status (SES) as two potential moderators of the TEI trajectory.

**Gender.** In terms of the initial level at age 10-11, girls had significantly higher Intrapersonal and especially Interpersonal self-concepts than boys, whereas boys had significantly higher Adaptability self-concepts than girls (support for H2). This gendered pattern is a very robust finding in the TEI literature, replicated across various measures and samples: women feel more competent in the areas of emotional expressivity, understanding, and empathy, whereas men feel more competent in the areas of emotion regulation, stress tolerance, and self-control (Bar-On & Parker, 2000b; McIntyre, 2010; Parker et al., 2011; Petrides, 2009; Petrides & Furnham, 2000; Siegling et al., 2012). Such gender-stereotyped self-perceptions are thought to emerge early in childhood and to remain stable from childhood to adulthood, shaped and reinforced through complex processes of socialization and cultural learning (Bussey & Bandura, 1999; Harter, 2006, 2012; Sanchez-Nunez et al., 2008). Consistent with this view, the prototypical gender differences in TEI were already significant at age 10-11 in our sample and remained so throughout the entire 6-year study period (support for H3).

In terms of change over time, the Interpersonal trajectory was the only one moderated by gender. Specifically, the trajectory was U-shaped for boys but linearly increasing for girls. One possible explanation for this interaction is that girls may be developmentally ahead of boys in this particular TEI domain. Not only do girls enter adolescence with a much higher level of
Interpersonal self-confidence than boys, but they also appear to have already reached the "maturity" phase of the developmental curve, whereas boys are still at the "re-calibration" stage. Interpersonal TEI is an important correlate of social functioning (Summerfeldt, Kloosterman, Antony, & Parker, 2006), and establishment of intimate relationships and close friendships is one of the most salient developmental tasks of adolescence (Saarni, 1999; Steinberg, 2005). Because many hormonal and neurological changes implicated in sexual motivation and advanced social cognition occur with the onset of puberty (Blakemore, 2008; Forbes & Dahl, 2010), and girls tend to be ahead of boys in pubertal and brain maturation by about one or two years (Beunen et al., 2000; Giedd et al., 1999), gender differences in the developmental course of Interpersonal self-concepts may be associated with gender differences in pubertal timing. Interestingly, the same explanation has been previously invoked by Klimstra et al. (2009), who found an analogous age by gender interaction for the Big Five trait of agreeableness, which is conceptually related to the Interpersonal TEI domain (Parker et al., 2011).

It should be noted that the EQi:YV-Brief Interpersonal subscale had a ceiling effect for girls in the current sample. There was no variability in girls’ Interpersonal slopes, indicating that every girl’s Interpersonal self-concept increased at the same rate with age. Moreover, girls’ Interpersonal mean at age 16-17 reached as high as 3.4 on a 4-point scale. If the measure is not sensitive enough to differentiate between girls with moderate to high levels of Interpersonal self-concept, then the true pattern of normative change in this domain may not be adequately represented by the trajectory we observed. Therefore, our Interpersonal results should be viewed as tentative and in need of further replication with a different measure of the construct.

**SES.** The Interpersonal domain was also the only trajectory that was moderated by SES. The trajectory was linearly increasing among participants from lower-SES households, but U-
shaped (for boys) or flat (for girls) among participants from higher-SES households. The differences were most pronounced at age 10-11 favouring higher-SES participants, but this gap disappeared by age 14-15. The reason for this interaction is unclear. One potential explanation may involve the big-fish-little-pond effect (BFLPE; Marsh & Hau, 2003; Marsh et al., 2007) for empathy self-perceptions. A recent study has found that individuals from lower-SES backgrounds tend to outperform individuals from higher-SES backgrounds on objective measures of emotion perception and empathic accuracy (Kraus, Côté, & Keltner, 2010).

According to Kraus et al., this is because lower-class individuals tend to be more attuned to the external features of the social environment upon which their lives are dependent, whereas higher-class individuals tend to be more inwardly-focused and autonomous. If so, then children living in higher-SES areas may initially develop stronger Interpersonal self-concepts relative to their generally less empathic peer group (the BFLPE), whereas the opposite social-comparison effect might occur for children living in lower-SES areas. When children move from primary to high school in early adolescence, their expanded social network would arguably become more socioeconomically diverse. Social comparison processes would lead children to re-adjust their self-concepts in accordance with their new reference groups, thus ameliorating the initial differences.

Because SES was significantly associated with survey attrition and non-response in the current sample, a more socioeconomically diverse sample might present a different Interpersonal trajectory than the one reported here. Based on our results, this trajectory would likely be less curvilinear, instead reflecting a steady linear increase in mean levels with age (even for boys). This caveat needs to be kept in mind when generalizing our findings to other populations. As for the other two TEI domains, we found no evidence that their trajectories might differ depending
on SES. There was a small main effect of SES on the Adaptability self-concept favouring higher-SES participants; however, it only reached significance for boys, and the differences remained consistent over the entire study period (i.e., no age by SES interaction).

**Other moderators.** Apart from gender and SES explored in the current study, future research should examine the role of other potential moderators of change in TEI. Given the important role of reflected self-appraisals in the formation of youths’ self-concepts (Harter, 2006, 2012), parental attitudes and practices would make a likely set of moderators. In the academic domain, for example, youths’ competence self-perceptions have been consistently and temporally linked to parental values, expectations, and beliefs about their child’s competence (Bouchey & Harter, 2005; Frome & Eccles, 1998; Jacobs & Eccles, 1992). Likewise, perceptions of parental warmth, support, and secure attachment have been found to contribute positively to youths’ self-concepts in various academic and non-academic domains (Isabella & Diener, 2010; Nishikawa, Sundbom, & Hägglöf, 2010). Exploring the longitudinal relationships between parents’ emotion-related standards and practices, youths’ perceptions of parental expectations and attitudes, and youth’s own TEI self-concepts would provide valuable knowledge about the developmental dynamics in TEI. Besides parent-child dynamics, interpersonal relationships with teachers and peers may serve as additional sources of reflected self-appraisals about one’s abilities (Bouchey & Harter, 2005). What is more, reflected self-appraisals of parents, teachers, and peers appear to have differential effects on different domains of self-concept (e.g., parents and teachers – on academic self-concept; peers – on social self-concept) (Pfeifer et al., 2009; Verschueren, Doumen, & Buyse, 2012). Whether such source-domain specificity would apply to different TEI domains is an intriguing question warranting future investigation.
Another relevant moderator to consider would be culture. Cross-cultural research on self-construal indicates that self-concepts of individuals from individualistic cultures (e.g., Canada and the US) tend to emphasize personal autonomy and independence, whereas self-concepts of individuals from collectivistic cultures (e.g., South Korea and Japan) tend to be more interdependent and socially contextualized (Markus & Kitayama, 1991). Thus, different cultural members may place relative emphasis on different frames of reference when evaluating their EI competence. For example, a recent neuroimaging study has found that individuals with greater interdependent self-construal tend to rely more on reflected self-appraisals to make judgments about themselves (Ray et al., 2010). Cultural differences also exist in the norms and expectations concerning emotion expression and regulation: individualistic cultures tend to value emotions more and encourage their free expression, whereas collectivistic cultures tend to value emotions less and require emotional suppression for the sake of group cohesion (Matsumoto, Yoo, & Fontaine, 2008; Matsumoto, Yoo, & Nakagawa, 2008). These cultural differences may not only moderate the shape of the TEI trajectory, but may also produce opposing differential distinctiveness effects akin to the gendered patterns found in the current study (described next).

**Differential Distinctiveness**

The presence of significant individual differences in TEI trajectories allowed us to investigate the joint patterns of correlated development among the three TEI domains. As predicted, all three TEI domains were moderately to strongly inter-correlated at age 10-11 (support for H4). In support of the differential distinctiveness hypothesis (H5), we found several clear patterns of domain differentiation and integration that were significantly moderated by gender. For girls, the Interpersonal and Adaptability trajectories remained moderately inter-correlated throughout the 6-year study period, whereas changes in the Interpersonal and
Intrapersonal domains were uncorrelated and even became slightly negatively associated with age. The opposite pattern was observed for boys: changes in the Interpersonal and Intrapersonal domains became even more strongly associated with age, whereas the Interpersonal and Adaptability trajectories became gradually uncorrelated. These patterns of increasing domain differentiation and integration can be explained in terms of internal frame-of-reference effects, whereby higher competence in one domain can enhance self-concepts in domains that one views to be related, but decrease self-concepts in domains that one perceives to be distinct (Marsh, 2007). Over time, these dimensional comparison processes would strengthen the association between more similar domains and weaken the association between less similar domains (Marsh & Ayotte, 2003).

This unique self-concept dynamic has important practical implications for socioemotional programs and interventions, as enhancing competence in one domain (e.g., Interpersonal) may inadvertently lower self-confidence in another domain (e.g., Intrapersonal) – an outcome that is highly dependent on gender. For example, it is possible that the more attuned individuals become to others’ emotions, and the more skilled they become at customizing their emotion-expression and self-presentation strategies to specific social contexts, the more uncertainty and confusion they may experience with regards to their own true feelings and emotions. Our results suggest that such a dynamic would be especially relevant for adolescent girls. For adolescent boys, on the contrary, Interpersonal competence went hand in hand with their emotional self-awareness, but it had differential association with the Adaptability self-concept. The latter effect may be connected to gender-typed ways of coping associated with the two TEI domains, Interpersonal – with social support seeking, Adaptability – with task-focused coping (Austin et al., 2010; Saklofske et al., 2012). To the extent that socially-oriented strategies are stereotypically female
and task-focused strategies are stereotypically male (Brody & Hall, 2000; Ptacek et al., 1992), acquiring greater interpersonal skills may be perceived as incongruent with one’s male gender identity, prompting doubts about one’s ability to perform as well in the male-typed domains. That such a dynamic would be less relevant for girls suggests that girls may be more accepting of having androgynous socioemotional characteristics within the self.

Although our interpretations of the differential distinctiveness effects are speculative, such within-person dynamics are certainly intriguing and warrant future investigation. Specifically, it would be important to disentangle the directionality of the observed cross-domain associations. As a first step, our results established whether change in one EI self-concept was correlated with change in another EI self-concept. A stronger test of the dimensional comparison explanation would involve experimental or longitudinal evidence demonstrating a causal path from change in performance in one domain to change in self-concept in the other domain, controlling for previous levels of self-concept and ability (Marsh & Hau, 2004; Möller et al., 2009; Möller et al., 2011). Testing whether these effects are age-bound or generalizable to adult samples would also be important. Indeed, Harter’s (2006, 2012) research indicates that dimensional and social comparisons are particularly salient during adolescence, resulting in highly differentiated and compartmentalized self-views. By late adolescence and young adulthood, however, self-concept structure tends to become more balanced and integrated, and the same differential distinctiveness effects may no longer apply. Examination of developmental change in within-person TEI profiles (i.e., ipsative continuity; de Fruyt et al., 2006) would also be informative, as different configurations of perceived strengths and weaknesses within an individual can have differential implications for real-life outcomes (Keefer et al., 2012).
Methodological Considerations

The current study had a number of methodological strengths that lend confidence to our conclusions. First, the use of a longitudinal (vs. cross-sectional) design allowed us to make direct inferences about change, and the inclusion of four assessment waves further permitted tests of the key prediction of a curvilinear course of TEI over time, which would not have been possible with fewer time points. Second, by modelling mean-level differences within a latent growth modelling framework (vs. analysis of variance), we were able to estimate not only the average trajectory for the population as a whole, but also the amount of individual variability around the mean, which in turn enabled examination of the moderating effects of gender and SES on these trajectories. Third, our analyses were based on a large nationally-representative population-based dataset, the National Longitudinal Survey of Children and Youth (NLSCY; Statistics Canada, 2010), which utilized rigorous data collection procedures and high integrity ethics protocols. Lastly, to ensure that the results were not confounded by measurement error or differential item functioning, we modelled all constructs at the latent-variable level, controlling for unreliability and partial measurement non-invariance (Chan, 1998; Wu et al., 2010; see also Study 1).

However, several limitations must also be acknowledged. As in all multi-year longitudinal studies (Denham et al., 2009), there was moderate amount of longitudinal attrition and survey non-response (47% over 6 years), which was commensurate with the average attrition rates (42-44% over 6-7 years) reported in two large meta-analyses of longitudinal studies of temperament and personality (Roberts et al., 2006; Roberts & DelVecchio, 2000). We took several measures to minimize the effects of attrition on the current results. First, our analyses were weighted by the NLSCY longitudinal survey weights designed to preserve the original population demographics (as of Cycle 1 in 1994) with respect to age, sex, and province. Second,
we explicitly accounted for the effects of SES, which was the only significant predictor of missingness in the current sample, by including it as a moderator of change in the analyses. It should be noted that SES indices are among the most commonly reported predictors of longitudinal survey non-response (Lepkowski & Couper, 2002; Lillard & Panis, 1998; Radler & Ryff, 2010). Importantly, no other demographic or TEI variables were associated with missing data in the current sample. Therefore, barring the effect of SES on the Interpersonal trajectory (as described above), the impact of longitudinal attrition on the current results was likely minimal – a conclusion that is further supported by the null attrition effects found in a meta-analysis of mean-level changes in personality (Roberts et al., 2006).

The TEI measure used in the current study is a highly abridged version of the original EQi:YV assessment. Although its truncation has permitted the inclusion of the TEI variables in the NLSCY, an invariable trade-off is that the Brief form is limited in the scope of its conceptual coverage, and so its equivalence to the full-length assessment cannot be assumed (Smith, McCarthy, & Anderson, 2000). Moreover, the stringent but necessary requirement of measurement invariance precluded us from using one of the EQi:YV-Brief subscales (Stress Management) in the analyses. Therefore, future studies should seek to replicate the current findings with the full-length EQi:YV and to extend them to other measures and TEI domains. In this respect, our results highlight the importance of using multi-dimensional assessments to study the developmental dynamics of TEI. Although we used chronological age as a proxy for normative development, it may not be the most accurate marker of when change occurs, given the significant variability in pubertal timing and cognitive maturation between and within genders. This may have attenuated the amount of change captured by our trajectory. Future studies should anchor TEI development to indices of puberty and cognitive development instead.
Conclusion

The findings of the current study contribute to several emergent themes shaping current theoretical thought and research on TEI. First, they provide the first of its kind (and long overdue; Schaie, 2001) lifespan developmental perspective on TEI, not only corroborating its distinction from the ability EI model, but also suggesting potential explanations for these differences by drawing on the well-established literature on self-concept (Harter, 2012; Markus & Wurf, 1987; Marsh, 2007). Second, our findings emphasize the importance of a multi-dimensional perspective in the study of TEI and its development (Marsh & Craven, 2006; Parker et al., 2011), revealing complex within- and between-domain dynamics that cannot be adequately represented by a global TEI construct. Third, our results add to the growing interest in the gendered nature of TEI and its complex links with the gender identity processes (Siegling et al., 2012). Lastly, our study extends existing research on the nomological links between TEI and core personality traits (Petrides et al., 2007; Vernon et al., 2008) to a qualitatively distinct level/layer of personality variables, namely self-concepts. Contemporary integrative models of personality (Caspi et al., 2005; McAdams & Olson, 2010; Sheldon et al., 2011) highlight the need to consider the reciprocal associations between core traits, surface-level characteristics, and sociocultural contexts in the study of lifespan development. We hope that our proposed theoretical perspective on where and how TEI fits into this broader personality structure will facilitate new research directions on the nature and functions of TEI.
References


Chan, D. (1998). The conceptualization and analysis of change over time: An integrative approach incorporating longitudinal mean and covariance structures analysis (LMACS) and multiple indicator latent growth modeling (MLGM). *Organizational Research Methods, 1*, 421-483.


Saklofske, D. H., Austin, E., Mastoras, S., Beaton, L., & Osborne, S. E. (2012). Relationships of personality, affect, emotional intelligence and coping with student stress and academic


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Table 1

Household Demographic Characteristics for the Study Sample at Cycle 5

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Weighted %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area of residence:</td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>12.0</td>
</tr>
<tr>
<td>Urban, population &lt; 30,000</td>
<td>26.3</td>
</tr>
<tr>
<td>Urban, population 30,000 to 99,999</td>
<td>8.8</td>
</tr>
<tr>
<td>Urban, population 100,000 to 499,999</td>
<td>14.5</td>
</tr>
<tr>
<td>Urban, population 500,000 or over</td>
<td>38.4</td>
</tr>
<tr>
<td>Relationship of PMK to the child:</td>
<td></td>
</tr>
<tr>
<td>Biological mother</td>
<td>89.8</td>
</tr>
<tr>
<td>Biological father</td>
<td>8.2</td>
</tr>
<tr>
<td>Other</td>
<td>2.0</td>
</tr>
<tr>
<td>Age of PMK (years):</td>
<td></td>
</tr>
<tr>
<td>&lt; 35</td>
<td>11.5</td>
</tr>
<tr>
<td>35-39</td>
<td>39.4</td>
</tr>
<tr>
<td>40+</td>
<td>49.1</td>
</tr>
<tr>
<td>Age of PMK’s spouse/partner (years):</td>
<td></td>
</tr>
<tr>
<td>&lt; 35</td>
<td>4.5</td>
</tr>
<tr>
<td>35-39</td>
<td>19.9</td>
</tr>
<tr>
<td>40+</td>
<td>56.0</td>
</tr>
<tr>
<td>Not available</td>
<td>19.6</td>
</tr>
<tr>
<td>Highest level of education of PMK:</td>
<td></td>
</tr>
<tr>
<td>Less than secondary</td>
<td>9.9</td>
</tr>
<tr>
<td>Secondary school graduation</td>
<td>27.0</td>
</tr>
<tr>
<td>Beyond high school</td>
<td>12.9</td>
</tr>
<tr>
<td>College or university degree</td>
<td>50.2</td>
</tr>
<tr>
<td>Highest level of education of PMK’s spouse/partner:</td>
<td></td>
</tr>
<tr>
<td>Less than secondary</td>
<td>10.9</td>
</tr>
<tr>
<td>Secondary school graduation</td>
<td>18.9</td>
</tr>
<tr>
<td>Beyond high school</td>
<td>10.8</td>
</tr>
<tr>
<td>College or university degree</td>
<td>36.6</td>
</tr>
<tr>
<td>Not available</td>
<td>22.8</td>
</tr>
<tr>
<td>Household income ($)</td>
<td></td>
</tr>
<tr>
<td>Less than 30,000</td>
<td>3.2</td>
</tr>
<tr>
<td>30,000 to 39,999</td>
<td>6.7</td>
</tr>
<tr>
<td>40,000 to 49,999</td>
<td>9.0</td>
</tr>
<tr>
<td>50,000 to 59,999</td>
<td>7.1</td>
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<tr>
<td>60,000 to 79,999</td>
<td>18.3</td>
</tr>
<tr>
<td>80,000 or more</td>
<td>36.3</td>
</tr>
<tr>
<td>Not available</td>
<td>19.4</td>
</tr>
</tbody>
</table>

*Note. N = 773. PMK = person most knowledgeable about the child.*
Table 2

Model-Fit Results for the Single-Domain MLGMs

<table>
<thead>
<tr>
<th>Model</th>
<th>df</th>
<th>$\chi^2$</th>
<th>RMSEA</th>
<th>(90% CI)</th>
<th>AIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intrapersonal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero growth</td>
<td>50</td>
<td>250.01*</td>
<td>.072</td>
<td>(.063, .081)</td>
<td>150.01</td>
</tr>
<tr>
<td>Linear growth</td>
<td>47</td>
<td>189.34*</td>
<td>.063</td>
<td>(.053, .072)</td>
<td>95.34</td>
</tr>
<tr>
<td>Quadratic growth</td>
<td>43</td>
<td>160.60*</td>
<td>.060</td>
<td>(.050, .069)</td>
<td>74.60</td>
</tr>
<tr>
<td><strong>Interpersonal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero growth</td>
<td>48</td>
<td>230.29*</td>
<td>.070</td>
<td>(.061, .079)</td>
<td>134.29</td>
</tr>
<tr>
<td>Linear growth</td>
<td>45</td>
<td>185.23*</td>
<td>.064</td>
<td>(.054, .073)</td>
<td>95.23</td>
</tr>
<tr>
<td>Quadratic growth</td>
<td>44</td>
<td>178.95*</td>
<td>.063</td>
<td>(.053, .073)</td>
<td>90.95</td>
</tr>
<tr>
<td><strong>Adaptability</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero growth</td>
<td>49</td>
<td>293.54*</td>
<td>.080</td>
<td>(.072, .089)</td>
<td>195.54</td>
</tr>
<tr>
<td>Linear growth</td>
<td>46</td>
<td>246.91*</td>
<td>.075</td>
<td>(.066, .084)</td>
<td>154.91</td>
</tr>
<tr>
<td>Quadratic growth</td>
<td>43</td>
<td>197.56*</td>
<td>.068</td>
<td>(.059, .078)</td>
<td>111.56</td>
</tr>
</tbody>
</table>

*Bolded = best-fitting model.

Note. $N = 773$. *p < .05

*a Variance and covariances of the quadratic growth factor were set to 0 to allow for convergence.

*b Variance of the first-order factor residual at Cycle 5 was set to 0 to allow for convergence.
Table 3

Non-Standardized Growth Parameter Estimates from the Single-Domain MLGMs

<table>
<thead>
<tr>
<th>Domain</th>
<th>Intercept</th>
<th>Linear Slope</th>
<th>Quadratic Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Variance</td>
<td>Mean</td>
</tr>
<tr>
<td>Intrapersonal</td>
<td>2.56*</td>
<td>0.25*</td>
<td>0.14*</td>
</tr>
<tr>
<td>Interpersonal</td>
<td>3.11*</td>
<td>0.09*</td>
<td>0.04</td>
</tr>
<tr>
<td>Adaptability</td>
<td>2.90*</td>
<td>0.43*</td>
<td>0.17*</td>
</tr>
</tbody>
</table>

Note. N = 773. * Higher values indicate greater decrease in mean levels. * p < .05
Table 4

Standardized Correlations among the Growth Factors from the Correlated Multi-Domain MLGM

<table>
<thead>
<tr>
<th></th>
<th>Intercepts</th>
<th>Linear Slopes</th>
<th>Quadratic Slopes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INTRA</td>
<td>INTER</td>
<td>ADAP</td>
</tr>
<tr>
<td>Intercepts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTRA</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTER</td>
<td>.61*</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>ADAP</td>
<td>.67*</td>
<td>.69*</td>
<td>--</td>
</tr>
<tr>
<td>Linear Slopes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTRA</td>
<td>.32</td>
<td>.09</td>
<td>.27</td>
</tr>
<tr>
<td>INTER</td>
<td>.29</td>
<td>.12</td>
<td>.59*</td>
</tr>
<tr>
<td>ADAP</td>
<td>.47*</td>
<td>.48*</td>
<td>.82*</td>
</tr>
<tr>
<td>Quadratic Slopes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTRA</td>
<td>.19</td>
<td>.00</td>
<td>.14</td>
</tr>
<tr>
<td>ADAP</td>
<td>.56*</td>
<td>.43*</td>
<td>.97*</td>
</tr>
</tbody>
</table>

*Note. N = 773. INTRA = Intrapersonal; INTER = Interpersonal; ADAP = Adaptability. * p < .05.*
Table 5

Non-Standardized Growth Parameter Estimates from the Multiple-Group MLGMs by Gender

<table>
<thead>
<tr>
<th>Domain</th>
<th>Intercept</th>
<th>Linear Slope</th>
<th>Quadratic Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Variance</td>
<td>Mean (^{a})</td>
</tr>
<tr>
<td><strong>Intrapersonal</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>2.63*</td>
<td>0.11</td>
<td>0.15*</td>
</tr>
<tr>
<td>Boys</td>
<td>2.45*</td>
<td>0.44*</td>
<td>0.12*</td>
</tr>
<tr>
<td>(\Delta \chi^2(1))</td>
<td>5.42*</td>
<td>4.54*</td>
<td>0.20</td>
</tr>
<tr>
<td><strong>Interpersonal</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>3.22*</td>
<td>0.06*</td>
<td>–0.06*</td>
</tr>
<tr>
<td>Boys</td>
<td>2.95*</td>
<td>0.21*</td>
<td>0.09*</td>
</tr>
<tr>
<td>(\Delta \chi^2(1))</td>
<td>34.15*</td>
<td>10.84*</td>
<td>9.42*</td>
</tr>
<tr>
<td><strong>Adaptability</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>2.80*</td>
<td>0.41*</td>
<td>0.17*</td>
</tr>
<tr>
<td>Boys</td>
<td>3.01*</td>
<td>0.43*</td>
<td>0.18*</td>
</tr>
<tr>
<td>(\Delta \chi^2(1))</td>
<td>14.46*</td>
<td>0.09</td>
<td>0.04</td>
</tr>
</tbody>
</table>

*Note.* \(^{a}\) Positive values indicate decrease in mean levels; negative values indicate increase in mean levels.

* *p < .05*
Table 6

Standardized Regression Coefficients for the SES Effects from the Conditional Multiple-Group MLGM by Gender

<table>
<thead>
<tr>
<th>Group</th>
<th>INTRA</th>
<th>INTER</th>
<th>ADAP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>Linear</td>
<td>Quadratic</td>
</tr>
<tr>
<td>Boys</td>
<td>.07</td>
<td>.12</td>
<td>.17</td>
</tr>
<tr>
<td>Girls</td>
<td>.15</td>
<td>.18</td>
<td>.16</td>
</tr>
</tbody>
</table>

*Note. INTRA = Intrapersonal; INTER = Interpersonal; ADAP = Adaptability. *p < .05*
Figure 1. Parameterization of a single-domain multiple-indicator latent growth model (MLGM) with quadratic growth (Chan, 1998). C5 = Cycle 5 (age 10-11); C6 = Cycle 6 (age 12-13); C7 = Cycle 7 (age 14-15); C8 = Cycle 8 (age 16-17); RA1-3 = Intrapersonal item scores. Estimated model parameters: \( \lambda \) = factor loading; \( \tau \) = item intercept (mean); \( \varepsilon \) = residual (error) variance; \( \zeta \) = first-order factor residual variance; \( \mu \) = growth factor mean; \( \sigma^2 \) = growth factor variance; \( \sigma \) = growth factor covariance. In addition, residual covariances between identical items across cycles were freely estimated to account for non-independence of uniquenesses over time (Marsh & Grayson, 1994).
Figure 2. Estimated mean-level trajectories of trait emotional intelligence in the full sample.
Figure 3. Moderating effects of gender on the estimated mean-level trait emotional intelligence trajectories.
**Figure 4.** Moderating effect of socio-economic status (plotted at ± 1 SD) on the estimated mean-level Interpersonal trajectory.
CHAPTER 4

Implications and Conclusions

Despite the growing application of emotional intelligence (EI) in diverse educational, organizational, and community settings (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Nelis et al., 2011; Qualter, Whiteley, Hutchinson, & Pope, 2007; Zijlmans, Embregts, Gerits, Bosman, & Derksen, 2011), research on the developmental dynamics of this multi-faceted construct remains heavily weighted by the ability EI (AEI) perspective, whereas trait EI (TEI) has received virtually no attention in the developmental literature (Arsenio, 2003; Mavroveli, Petrides, Shove, & Whitehead, 2008). This is a significant oversight, as the two EI components tend to contribute independently, and often in differential ways, to the prediction of important outcomes (Davis & Humphrey, 2012a,b,c; Qualter, Gardner, Pope, Hutchinson, & Whiteley, 2012; Schutte, Malouff, & Hine, 2011). The goal of the current research was to delineate an empirically-validated and developmentally-informed framework for understanding, measuring, and ultimately promoting change in TEI. Results of the current research contribute to the advancement of TEI theory, assessment, and practice in several important and novel ways.

Implications for Theory

First and foremost, our results corroborate and extend the conceptual distinction between objective EI abilities, or ability EI (AEI), and subjective EI self-perceptions, or trait EI (TEI) (Petrides, 2011; Petrides & Furnham, 2001). Previous comparative studies have found that AEI and TEI tend to correlate only weakly or moderately with each other, relate differentially to intelligence and personality, and contribute independently to the prediction of external criteria and outcomes (Brackett & Mayer 2003; Brannick, Wahi, Arce, & Johnson, 2009; Zeidner, Shani-Zinovich, Matthews, & Roberts, 2005). Our findings extend this evidence, showing that the
normative developmental course of TEI in adolescence does not match the predicted increase in EI abilities with age (Mayer, Caruso, & Salovey, 1999; Saarni, 1999). Instead, we observed a curvilinear trend for TEI, whereby EI self-perceptions declined, on average, between late childhood and early adolescence, with a tendency to subsequently increase in middle and late adolescence.¹

To understand the nature of this distinctive developmental pattern we have proposed an integrative theoretical framework that connects the still-emerging TEI theory to the rich and well-established literature on self-concept (Harter, 2006, 2012; Marsh, 2007; Wigfield & Wagner, 2005). Apart from their common definition as subjective competence self-beliefs (Marsh, 2007; Petrides, 2010), many construct features that characterize self-concepts also apply to TEI, including their regulatory function with respect to coping and achievement behaviours, multi-dimensional structure, gendered nature, and location at the surface level/layer of the broader personality taxonomy. Not surprisingly, the same curvilinear mean-level trajectory that we found for TEI also typifies normative development of self-concepts in other areas (e.g., academic, social, physical) (Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002; Marsh, 1989; Wigfield, Eccles, Maclver, Reuman, & Midgley, 1991).

An even more important benefit of connecting TEI to the research on self-concept is that it allowed us to explicate potential processes that may contribute to TEI formation, continuity, and change. As social-cognitive constructions, self-evaluations of competence are influenced by multiple frames of reference, only one of which involves past behaviour and actual ability per se (Marsh, 2007). These additional frames of reference include: (a) reflected self-appraisals –

¹ The curvilinear shape of the Interpersonal trajectory was slightly different: it showed little change in pre-adolescence but accelerated growth later in adolescence.
impressions of others’ evaluations, standards, values, and expectations for the self (Harter, 2012; Pfeifer et al., 2009); (b) social comparisons in relation to relevant others (Festinger, 1954; Marsh & Hau, 2003; Marsh, Trautwein, Lüdtke, Baumert, & Köller, 2007); (c) temporal comparisons in relation to one’s ideal self-standards (Harter, 2012; Higgins, 1987); and (d) dimensional comparisons in relation to one’s perceived competence in other domains (Marsh & Hau, 2004; Möller, Pohlmann, Köller, & Marsh, 2009). According to the self-concept theory (Harter, 2006, 2012), normative-developmental advances in cognitive and social structures systematically influence the salience and utilization of different frames of reference at different periods during development, producing predictable changes in self-concepts over time. Therefore, although we did not assess these processes directly, they are necessarily implied in the characteristic curvilinear pattern of mean-level change we observed for TEI. Nevertheless, future studies should explicitly test the extent to which EI self-reports are susceptible to different frame-of-reference effects.

One such test may involve an experimental manipulation of frames of reference via different instruction sets. For example, participants can be assigned to complete the TEI questionnaire in the original format plus in one of several other ways: (a) how they think their parents/friends/teachers see them (reflected self-appraisals); (b) how they see themselves in relation to their classmates/peers (social comparisons); (c) how they see themselves in relation to their past behaviour (temporal comparisons); or (d) how they see themselves in relation to their ideal standard for themselves (actual-ideal discrepancy). Testing the dimensional comparison processes would involve experimental or longitudinal evidence demonstrating a causal path from change in performance (or experimentally controlled feedback about one’s performance) in one TEI domain to change in self-concept in another TEI domain, controlling for previous levels of
self-concept and ability in both domains (Marsh & Hau, 2004; Möller et al., 2009). This basic model can be extended to test changes in EI self-concepts as a result of performance in stereotypically incompatible domains (e.g., logical reasoning), and vice versa.

Another important implication of frames of reference is that they may also contribute to individual differences in TEI above and beyond normative-developmental changes and differences in actual EI abilities. Indeed, we found significant variability in individual trajectories around the normative mean, suggesting that not all children experienced a decline in their EI self-concepts at the transition to adolescence. In this regard, our results revealed that gender and socioeconomic status (SES) – two powerful sociodemographic factors – moderated the mean-level trajectory of interpersonal self-concepts, whereby girls (vs. boys) and children from lower (vs. higher) SES backgrounds were more likely to experience linear increases (vs. curvilinear trend) in their interpersonal self-concepts over time. Future studies should examine other potential moderators of mean-level changes in TEI. Likely candidates for this work include interactions with significant others (parents, peers, teachers), which constitute important sources of reflected self-appraisals against which self-evaluations are made (Bouchey & Harter, 2005; Jacobs & Eccles, 1992; Pfeifer et al., 2009; Verschueren, Doumen, & Buyse, 2012). Another relevant moderator to consider would be culture, given the documented cross-cultural differences in independent (internal) versus interdependent (social) emphasis of self-construal (Markus & Kitayama, 1991), as well as in the norms and expectations concerning emotion expression and regulation (Matsumoto, Yoo, & Fontaine, 2008; Matsumoto, Yoo, & Nakagawa, 2008).

Several other tasks for future research derive directly from our proposed theoretical framework. The first obvious task is to integrate the TEI domains with other self-concepts empirically in an extended factor-analytic model. Within the current self-concept model
(Shavelson, Hubner, & Stanton, 1976; Marsh, 1990), EI self-concepts would likely form unique
and/or joint factors with other non-academic domains. Another outstanding construct validation
task is to model longitudinally co-development of TEI domains and the associated core
personality traits. For example, studies that have linked other surface-level characteristics (goals,
self-concepts) to the Big Five dimensions in this fashion have found that surface-level traits tend
to be less differentially stable over time than core traits, and more responsive to changes in social
contexts (Asendorpf & van Aken, 2003; Lüdtke, Trautwein, & Husemann, 2009). Obtaining
analogous evidence for EI self-concepts would provide novel discriminant validity evidence for
TEI vis-à-vis basic personality.

Lastly, it will be important to extend the current TEI trajectory into young adulthood – a
major life transition which is considered to be the pinnacle of identity and personality formation,
marking the beginning of a coherent life-long narrative about the self (Arnett, 2000; Erikson,
1968; Harter, 2012). The TEI trajectory during this period is expected to show further
pronounced increases in competence self-perceptions, in line with the maturity principle that
characterizes the development of personality dimensions at this age (i.e., increasing mean-levels
of emotional stability, agreeableness, and conscientiousness) (Caspi, Roberts, & Shiner, 2005;
Roberts, Walton, & Viechtbauer, 2006). In support of this prediction, a recent cross-sectional
study has found significant age differences in TEI, whereby older adults had higher mean TEI
levels than younger adults, who in turn had higher mean TEI levels than adolescents (Tsaousis &
Kazi, 2013). At least one previous longitudinal study has documented a significant increase in
mean TEI levels over a 3-year transition from high school to university (Parker, Saklofske,
Wood, Eastabrook, & Taylor, 2005). Although the period captured in the current research is
characterized by relatively small mean-level changes compared to the changes expected to occur
later in young adulthood, it represents a pivotal turning point in the development of self-concepts, which evolve from externally bound and unrealistically positive self-descriptions in childhood to fully self-aware and intrinsically motivated self-concepts in adulthood (Harter, 2006, 2012).

**Implications for Measurement**

Substantive inferences about developmental change are only valid to the extent that the measure used to assess change functions equivalently across different age periods (Bates & Novosad, 2005; Denham, Wyatt, Bassett, Echeverria, & Knox, 2009; Marsh & Grayson, 1994). When responding to a TEI questionnaire, do items like “I can easily describe my feelings” evoke the same meaning in children as they do in adolescents? And do item responses reflect the same underlying competency (e.g., emotional self-awareness) evaluated on the same scale at different ages? Our analyses of the brief form of the Emotional Quotient Inventory – Youth Version (EQi:YV-Brief) indicated that its measurement structure remained consistent from late childhood (age 10-11) to adolescence (age 16-17), and that the relationships of most items to their respective factors remained unchanged during this 6-year period. This finding implies that the fundamental nature of the underlying TEI domains, as measured with the EQi:YV-Brief, was sufficiently consistent to allow drawing meaningful inferences about their differential dynamics over time.

However, the psychometric quality of youths’ EQi:YV-Brief responses was significantly poorer in childhood (age 10-11) than in adolescence (ages 12-13 and older), characterized by higher levels of measurement error, exaggerated responding, and acquiescent tendencies (i.e., endorsing items regardless of their wording or content). It should be noted that such erosion of measurement quality is very common among younger respondents, documented across numerous
self-report instruments and attributed to still-developing cognitive functions (e.g., reading comprehension, abstract thinking) at younger ages (Borgers, de Leeuw, & Hox, 2000; Parker, Eastabrook, Keefer, & Wood, 2010; Soto, John, Gosling, & Potter, 2008). Nevertheless, the presence of such differential measurement precision can produce biased mean-level estimates at younger ages, or even preclude mean-level comparisons over time, as was the case for one of the EQi:YV-Brief subscales in our study. Accordingly, all our inferences about normative change in TEI were based on latent-variable estimates obtained after controlling for measurement error and partial measurement non-invariance. Researchers and practitioners conducting repeated TEI assessments with children and adolescents should be aware of these methodological challenges when making inferences about mean-level change.

Another important implication of the current work is the necessity to employ a multi-dimensional assessment strategy for measuring EI self-concepts (vs. global TEI score). Consistent with research on other personality and self-concept structures (Byrne, & Shavelson, 1996; Soto et al., 2008), our results showed that the four TEI domains were already distinguishable at age 10-11, and they became progressively more differentiated from one another at older ages. Most importantly, different TEI domains were associated with counter-balancing gender differences, and their patterns of age integration and age differentiation unfolded in opposite directions for boys and girls. Such within-person cross-domain dynamics are a hallmark of dimensional comparison processes that contribute to changes in self-concepts over time, and they cannot be accounted for by a higher-order global self-concept (Marsh & Ayote, 2003). The costs of ignoring the multi-dimensionality of complex constructs have been well acknowledged in the psychological assessment literature, including losses in predictive
utility, ambiguous or conflicting results, and inaccurate decisions for individual test-takers (McGrath, 2005; Parker, Keefer, & Wood, 2011; Smith, McCarthy, & Zapolski, 2009).

**Implications for Practice**

The current research has important implications for interventions aimed at enhancing individuals’ socioemotional functioning and, ultimately, better relationships, performance, and wellbeing. A growing body of research indicates that TEI and AEI contribute independently to the prediction of important outcomes, including internalizing and externalizing symptomatology (Davis & Humphrey, 2012a,b), coping behaviours (Davis & Humphrey, 2012c; Gohm, Corser, & Dalsky, 2005), addiction-related problems (Schutte et al., 2011), and academic achievement (Qualter et al., 2012). Our results further reinforce the importance of considering both AEI and TEI when devising specific intervention plans. That the two aspects of EI follow divergent developmental paths suggests that enhancing EI abilities alone may not necessarily result in concomitant increases in EI self-concepts, and vice versa. Instead, the intervention effort will be maximized if both AEI and TEI are the targets of change.

Understanding the various frame-of-reference effects is particularly relevant when supporting individuals who have adequate socioemotional skills (average or high AEI) but lack self-confidence with respect to their emotional abilities (low TEI). The primary task for these individuals would be to identify, de-construct, and re-interpret the specific meta-cognitions that contribute to their low self-perceptions. Are their inferences of how they appear in the eyes of others unduly negative, leading to systematically biased reflected self-appraisals? Do they overestimate the emotional abilities of others, resulting in social comparisons that are unfavourable toward the self? Do they hold unrealistic expectations or overly high standards for what it means to be emotionally intelligent, creating a large discrepancy between actual and ideal
self? Or are there perceived incompatibilities in their self-concept schemas (e.g., either good at expressing emotions or good at controlling emotions, but not both) that prevent them from feeling efficacious in both domains? Answers to these questions would, in turn, dictate the most appropriate intervention strategies.

Attempts to improve actual EI abilities without addressing the underlying frame-of-reference effects may even backfire, by accentuating the discrepancy between the new (and high) standard of competence set by the intervention and one’s perceived level of (in)competence the source of which has not changed. There may also be cases when certain frames of reference would be less relevant than others. For example, due to their impoverished perspective taking capacity, individuals with an Autism spectrum disorder may not engage in social comparisons or reflected self-appraisals when evaluating their competencies (Pfeifer et al., 2009). Instead, they may rely more heavily on temporal comparisons with their past behaviour and on direct feedback from others about their strengths and capabilities. Developmental self-concept research suggests that many of the external and internal comparison processes implicated in self-concept formation gain special salience during the years spanning early and middle adolescence (Harter, 2006, 2012). This is also the period when the rank-ordering of individuals in TEI domains was found to be the least stable in our study, suggesting that EI competency beliefs at this age are rather malleable and sensitive to contextual inputs from the environment. Therefore, interventions that capitalize on the plasticity of EI self-concepts during this period may be particularly efficacious.

**Methodological Considerations**

A major methodological strength of the current study was its multi-wave longitudinal design based on a large nationally-representative population-based dataset, the National Longitudinal Survey of Children and Youth (NLSCY; Statistics Canada, 2010). The NLSCY
utilizes rigorous data collection procedures and high integrity ethics protocols, and it remains one of the most comprehensive sources of longitudinal information on TEI to date. The use of the longitudinal (vs. cross-sectional) design allowed us to make direct inferences about change (after establishing adequate levels of measurement invariance), and the inclusion of four assessment waves further permitted tests of linear as well as curvilinear trajectories of TEI over time, which would not have been possible with fewer time points. However, working with the NLSCY dataset also had its limitations.

As in all multi-year longitudinal studies (Denham et al., 2009), there was moderate amount of longitudinal attrition and survey non-response in the current sample (47% over 6 years), which was commensurate with the average attrition rates (42-44% over 6-7 years) reported in two large meta-analyses of longitudinal studies of temperament and personality (Roberts et al., 2006; Roberts & DelVecchio, 2000). Due to logistical constraints, our modeling analyses were based on correlation matrices with means and standard deviations as model inputs. This has precluded us from implementing the state-of-the-art missing data handling techniques, such as maximum likelihood method, which requires raw data as model input (Baraldi & Enders, 2010). Although cases with incomplete data were excluded from the analyses, we took several measures to minimize the effects of non-response on the current results.

First, our analyses were weighted by the NLSCY longitudinal survey weights designed to preserve the original population demographics (as of Cycle 1 in 1994) with respect to age, sex, and province. Second, we systematically examined patterns of missingness and predictors of non-response. These analyses revealed that households that dropped out of the NLSCY had significantly lower income and education levels compared to households that participated in all waves of the current study. Accordingly, we explicitly accounted for the effects of SES, by
including it as a moderator of mean-level change in Study 2 analyses. It should be noted that SES indices are among the most commonly reported predictors of longitudinal survey non-response (Lepkowski & Couper, 2002; Lillard & Panis, 1998; Radler & Ryff, 2010). Importantly, no other demographic or TEI variables were associated with missing data. Therefore, barring the effect of SES, which we explicate in some detail (see Study 2), the impact of longitudinal attrition on the current results was likely minimal – a conclusion that is further supported by the null attrition effects found in previous meta-analytic studies of rank-order and mean-level continuity of personality (Roberts et al., 2006; Roberts & DelVecchio, 2000).

The TEI measure used in the NLSCY is a highly abridged version of Bar-On and Parker’s (2000) original EQi:YV assessment. Although its truncation has permitted the inclusion of TEI variables in the NLSCY, several necessary trade-offs accompany the use of short scales. First, given their brevity (3 items), not all of the EQi:YV-Brief subscales met the desirable Cronbach’s alpha of .70 (alphas were between .60 to .84), although alpha may not be the most appropriate criterion of internal consistency for such ultra-short scales – its calculation depends directly on the number of items (Simms & Watson, 2007). To circumvent this issue, we modelled all constructs at the latent-variable level, controlling for measurement error and partial measurement non-invariance (Chan, 1998; Wu, Liu, Gadermann, & Zumbo, 2010). A more consequential trade-off is that the Brief form is invariably limited in the scope of its conceptual coverage, and so its equivalence to the full-length assessment cannot be assumed. Indeed, whereas three of the four EQi:YV-Brief subscales exhibited expected patterns of item parameters, inter-scale correlations, and gender differences, one subscale (Stress Management) was found to have erratic psychometric properties and so it could not be used. To increase confidence in the conclusions of the current research, and to support future work with the
NLSCY, an important next step would be to obtain discriminant, convergent, and predictive validity evidence for the EQi:YV-Brief subscales in relation to relevant external criteria. The full-length EQi:YV is one of the most widely used self-report TEI measures with school-aged respondents (Humphrey et al., 2011), and its conceptual multi-dimensional model has been well validated (Parker et al., 2011; Wood, Parker, & Keefer, 2009). Future studies should seek to replicate the current findings with the full-length EQi:YV, as well as other TEI measures.

**Conclusion**

The current program of research entails many firsts. It is the first multi-year longitudinal investigation to document the normative development of TEI in children and adolescents, providing the much needed lifespan perspective on TEI. It is also the first to test the underlying assumption of measurement invariance that is crucial for the assessment of change. Finally, it is the first to outline an integrative theoretical framework for understanding and investigating the development of TEI. By re-aligning the field’s orientation away from the trait vs. ability EI discourse and toward what we believe is a more generative connection with the rich literature on the self, we hope to facilitate new scientific advances and practical applications of this promising individual-differences construct.
References


Chan, D. (1998). The conceptualization and analysis of change over time: An integrative approach incorporating longitudinal mean and covariance structures analysis (LMACS) and multiple indicator latent growth modeling (MLGM). *Organizational Research Methods, 1*, 421-483.


## APPENDIX A

### Emotional Quotient Inventory – Youth Version, Brief Form

Now you will be asked about yourself and **how you relate to other people** at home, school and work. (Choose only one answer for each sentence.)

<table>
<thead>
<tr>
<th></th>
<th>Rarely True Of Me</th>
<th>Sometimes True Of Me</th>
<th>Often True Of Me</th>
<th>Very Often True Of Me</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. It is easy to tell people how I feel.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>b. I like doing things for others.</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>c. I get angry easily.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>d. I can understand hard questions.</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>e. I think that most things I do will turn out OK.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>f. I can talk easily about my feelings.</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>g. I feel bad when other people have their feelings hurt.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>h. I get upset easily.</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>i. I can come up with many ways of answering a hard question when I want to.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>j. I hope for the best.</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>k. I can easily describe my feelings.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>l. I know when people are upset, even when they say nothing.</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>m. When I get angry, I act without thinking.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>n. When answering hard questions, I try to think of many solutions.</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>o. I enjoy the things I do.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Statistics Canada will keep your answers PRIVATE. No one from your home or your school will see what you write.

APPENDIX B

Study 1: Multiple-Group LMACS Analyses by Gender

The baseline multiple-group LMACS models provided acceptable fit to the male and female data: CFI ≥ .950 (except .884 for INTER), RMSEA (90% CI) ≤ .069 (.061, .077), SRMR ≤ .065, and were followed by the nested model comparisons analogous to those conducted in the full sample (see Table B1). The assumptions of both longitudinal and cross-gender metric invariance were upheld for the INTRA and ADAP subscales, suggesting that the same underlying constructs were being measured for boys and girls at all four cycles. Note: There was one statistically non-invariant INTRA loading in the male group (RA3 at Cycle 8 – see Table B2), but it had minimal impact on the temporal stability of the INTRA factor (all autocorrelation estimates were within .02 points of the baseline model – see Table B3) and therefore could be practically ignored.

Analogous to the full sample, the INTRA subscale further demonstrated cross-cycle and cross-gender intercept equivalence, allowing direct comparisons of the INTRA factor means between boys and girls and over time. However, only partial intercept invariance was established for the ADAP subscale. As in the full sample, both boys and girls found the AD3 item disproportionately easier to endorse at Cycle 5 than at all other cycles; in addition, the AD1 intercept at Cycle 5 was significantly lower for girls (see Table B2). As a result, Cycle 5 gender differences in the ADAP means were over-estimated (by about .09 \( d \) units) under the assumption of full scalar invariance (see Table B5). Otherwise, the ADAP factor means at Cycles 6, 7, and 8 were fully comparable between boys and girls and with one another.

For girls, the INTER and STRES subscales demonstrated acceptable longitudinal metric invariance. Note: There was one statistically non-invariant STRES loading in the female group
(SM2 at Cycle 8 – see Table B2), but it had minimal impact on the temporal stability of the
STRES factor (all autocorrelation estimates were within .02 points of the baseline model – see
Table B4) and therefore could be practically ignored. For boys, the INTER and STRES subscales
each contained one temporally non-invariant item that resulted in significant gender non-
equivalences on four factor loadings. Specifically, ER1 at Cycles 6, 7, and 8 and SM2 at Cycle 7
had substantially weaker relationships to their respective factors for boys than for girls (see Table
B2). These discrepancies were large enough that assuming full metric invariance led to an over-
estimation (by .10 points) of the Cycle 5/6 autocorrelation for INTER, and an under-estimation
(by .09 points) of the Cycle 7/8 autocorrelation for STRES among boys (see Table B3).

Further tests of scalar invariance revealed that the INTER intercepts were equivalent
across gender but not across cycles (see Table B2). As in the full sample, both boys and girls
found the ER1 item disproportionately easier to endorse at Cycle 5 than at all other cycles,
leading to an over-estimation of their Cycle 5 factor means. Therefore, the INTER factor means
were directly comparable between boys and girls but across Cycles 6, 7, and 8 only. The STRES
subscale showed full longitudinal intercept invariance for girls, allowing direct comparisons of
their STRES factor means over time. For boys, however, neither full nor partial intercept
invariance of the STRES subscale could be supported, as only one item (SM1) showed evidence
of cross-cycle and cross-gender intercept comparability. Because 2 out of 3 STRES items were
non-equivalent across 2 out of 4 cycles (after reverse-scoring, the SM2 intercepts were
significantly higher at Cycles 7 and 8, whereas the SM3 intercepts were significantly lower at
Cycles 5 and 6), these non-equivalences were deemed extensive enough to confound meaningful
comparisons of the STRES factor means across gender, as well as in the full sample over time.
Table B1

Model-Fit Indices and Nested Model Comparisons from the Multiple-Group LMACS Analyses

<table>
<thead>
<tr>
<th>Nested Invariance Models</th>
<th>$df$</th>
<th>$\chi^2$</th>
<th>CFI</th>
<th>Contrast</th>
<th>$\Delta df$</th>
<th>$\Delta \chi^2$</th>
<th>$\Delta CFI$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intrapersonal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Configural (unconstrained)</td>
<td>60</td>
<td>186.72*</td>
<td>.972</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>B. A with equal factor loadings</td>
<td>74</td>
<td>259.08*</td>
<td>.959</td>
<td>B vs. A</td>
<td>14</td>
<td>12.63*</td>
<td>-.013</td>
</tr>
<tr>
<td>B1. B with 1 factor loading free</td>
<td>73</td>
<td>239.97*</td>
<td>.963</td>
<td>B1 vs. A</td>
<td>13</td>
<td>53.25*</td>
<td>-.009</td>
</tr>
<tr>
<td>C. B1 with equal item intercepts</td>
<td>87</td>
<td>269.46*</td>
<td>.960</td>
<td>C vs. B1</td>
<td>14</td>
<td>29.49*</td>
<td>-.003</td>
</tr>
<tr>
<td>D. C with equal factor variances</td>
<td>94</td>
<td>272.59*</td>
<td>.960</td>
<td>D vs. C</td>
<td>7</td>
<td>3.13</td>
<td>-.000</td>
</tr>
<tr>
<td>F. D with equal factor covariances</td>
<td>100</td>
<td>294.34*</td>
<td>.957</td>
<td>F vs. D</td>
<td>6</td>
<td>21.75*</td>
<td>-.003</td>
</tr>
<tr>
<td><strong>Interpersonal</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>A. Configural (unconstrained)</td>
<td>60</td>
<td>278.70*</td>
<td>.884</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
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<td>B. A with equal factor loadings</td>
<td>74</td>
<td>349.69*</td>
<td>.854</td>
<td>B vs. A</td>
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<td>B1. B with 1 factor loading free</td>
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<td>294.77*</td>
<td>.883</td>
<td>B1 vs. A</td>
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<td>-.001</td>
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<td>C. B1 with equal item intercepts</td>
<td>87</td>
<td>417.04*</td>
<td>.868</td>
<td>C vs. B1</td>
<td>14</td>
<td>122.27*</td>
<td>-.015</td>
</tr>
<tr>
<td>C1. C with 1 item intercept free</td>
<td>86</td>
<td>340.55*</td>
<td>.897</td>
<td>C1 vs. B1</td>
<td>13</td>
<td>45.78*</td>
<td>.014</td>
</tr>
<tr>
<td>D. C1 with equal factor variances</td>
<td>93</td>
<td>415.17*</td>
<td>.870</td>
<td>D vs. C1</td>
<td>7</td>
<td>74.62*</td>
<td>-.027</td>
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<tr>
<td>D1. D with 2 factor variances free</td>
<td>91</td>
<td>358.44*</td>
<td>.892</td>
<td>D1 vs. C1</td>
<td>5</td>
<td>17.89*</td>
<td>-.005</td>
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<tr>
<td>F. D1 with equal factor covariances</td>
<td>97</td>
<td>392.86*</td>
<td>.881</td>
<td>F vs. D1</td>
<td>6</td>
<td>34.42*</td>
<td>-.011</td>
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<tr>
<td><strong>Stress Management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Configural (unconstrained)</td>
<td>60</td>
<td>206.96*</td>
<td>.950</td>
<td>--</td>
<td>--</td>
<td>--</td>
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<tr>
<td>B. A with equal factor loadings</td>
<td>74</td>
<td>347.41*</td>
<td>.908</td>
<td>B vs. A</td>
<td>14</td>
<td>140.45*</td>
<td>-.042</td>
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<tr>
<td>B1. B with 2 factor loadings free</td>
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<td>247.39*</td>
<td>.941</td>
<td>B1 vs. A</td>
<td>12</td>
<td>40.43*</td>
<td>-.009</td>
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<tr>
<td>C. B1 with equal item intercepts</td>
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<td>345.10*</td>
<td>.916</td>
<td>C vs. B1</td>
<td>14</td>
<td>97.71*</td>
<td>-.025</td>
</tr>
<tr>
<td>C1. C with 2 item intercepts free</td>
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<td>290.60*</td>
<td>.932</td>
<td>C1 vs. B1</td>
<td>12</td>
<td>25.18*</td>
<td>-.009</td>
</tr>
<tr>
<td>D. C1 with equal factor variances</td>
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<td>314.79*</td>
<td>.926</td>
<td>D vs. C1</td>
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<td>24.19</td>
<td>-.006</td>
</tr>
<tr>
<td>F. D1 with equal factor covariances</td>
<td>97</td>
<td>351.60*</td>
<td>.916</td>
<td>E vs. D</td>
<td>6</td>
<td>36.81*</td>
<td>-.010</td>
</tr>
<tr>
<td><strong>Adaptability</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Configural (unconstrained)</td>
<td>60</td>
<td>204.39*</td>
<td>.958</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>B. A with equal factor loadings</td>
<td>74</td>
<td>231.85*</td>
<td>.954</td>
<td>B vs. A</td>
<td>14</td>
<td>27.46*</td>
<td>-.004</td>
</tr>
<tr>
<td>C. B with equal item intercepts</td>
<td>88</td>
<td>383.33*</td>
<td>.922</td>
<td>C vs. B</td>
<td>14</td>
<td>151.48*</td>
<td>-.032</td>
</tr>
<tr>
<td>C1. C with 2 item intercepts free</td>
<td>86</td>
<td>279.55*</td>
<td>.947</td>
<td>C1 vs. B</td>
<td>12</td>
<td>47.70*</td>
<td>-.007</td>
</tr>
<tr>
<td>D. C1 with equal factor variances</td>
<td>93</td>
<td>292.09*</td>
<td>.946</td>
<td>D vs. C1</td>
<td>7</td>
<td>12.54</td>
<td>-.001</td>
</tr>
<tr>
<td>F. D with equal factor covariances</td>
<td>99</td>
<td>309.33*</td>
<td>.942</td>
<td>E vs. D</td>
<td>6</td>
<td>17.24*</td>
<td>-.004</td>
</tr>
</tbody>
</table>

*Note. N = 381 girls, 392 boys. $\Delta CFI = $ change in comparative fit index values.

* Non-trivial reduction in model fit. $^* p < .05$
Table B2

Measurement Parameter Estimates from the Multiple-Group Baseline LMACS Models

<table>
<thead>
<tr>
<th>Item</th>
<th>Female Group (N = 381)</th>
<th>Male Group (N = 392)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Factor Loadings</td>
<td>Observed Item Means</td>
</tr>
<tr>
<td></td>
<td>C5 C6 C7 C8</td>
<td>C5 C6 C7 C8</td>
</tr>
<tr>
<td>INTRA</td>
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<td>RA1</td>
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<tr>
<td>RA2</td>
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<tr>
<td>RA3</td>
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<td>ER1</td>
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<td>ER2</td>
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<td>ER3</td>
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<td>SM1</td>
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<td>3.14 3.09 2.91 2.93</td>
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<tr>
<td>SM2</td>
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<td>SM3</td>
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<td>ADAPT</td>
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<td>AD1</td>
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<td>2.57 .25 .21 .25</td>
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<td>AD2</td>
<td>.84 .86 .81 .86</td>
<td>2.91 2.72 2.69 2.68</td>
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<tr>
<td>AD3</td>
<td>.62 .69 .56 .69</td>
<td>3.16 .27 .26 .27</td>
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</tbody>
</table>

Note. Factor loadings are standardized, item means are non-standardized. All parameter estimates are significant (p < .05). C5 = Cycle 5 (age 10-11); C6 = Cycle 6 (age 12-13); C7 = Cycle 7 (age 14-15); C8 = Cycle 8 (age 16-17). INTRA = Intrapersonal; INTER = Interpersonal; STRES = Stress Management; ADAPT = Adaptability.

a Cross-cycle differential item functioning

b Cross-gender differential item functioning
Table B3

Temporal Stability Coefficients (Autocorrelations) for the EQi:YV-Brief Subscale Scores and their Corresponding LMACS Latent Factors in the Male Group

<table>
<thead>
<tr>
<th>Estimate</th>
<th>1&lt;sup&gt;st&lt;/sup&gt; order</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt; order</th>
<th>3&lt;sup&gt;rd&lt;/sup&gt; order</th>
<th>Mean r</th>
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<tbody>
<tr>
<td></td>
<td>C5/C6 C6/C7 C7/C8</td>
<td>C5/C7 C6/C8</td>
<td>C5/C8</td>
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<td><strong>Intrapersonal</strong></td>
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<tr>
<td>Subscale scores</td>
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<td>.15 .39</td>
<td>.24 .32</td>
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</tr>
<tr>
<td>LMACS models:</td>
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<td></td>
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<td></td>
</tr>
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<td>Baseline</td>
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<td>.17 .46</td>
<td>.24 .36</td>
<td></td>
</tr>
<tr>
<td>Partial metric</td>
<td>.35 .48 .49</td>
<td>.16 .47</td>
<td>.26 .37</td>
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<tr>
<td>Full metric</td>
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<td>.26 .36</td>
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<tr>
<td><strong>Interpersonal</strong></td>
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</tr>
<tr>
<td>Subscale scores</td>
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<td>.10 .27</td>
<td>.24 .28</td>
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<td>LMACS models:</td>
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<tr>
<td>Baseline</td>
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<td><strong>Stress Management</strong></td>
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<tr>
<td>Subscale scores</td>
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<td>.14 .60</td>
<td>.08&lt;sup&gt;a&lt;/sup&gt; .33</td>
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</tr>
<tr>
<td>Baseline</td>
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<td>.10&lt;sup&gt;a&lt;/sup&gt; .41</td>
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<tr>
<td>Partial metric</td>
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<td>.13&lt;sup&gt;a&lt;/sup&gt; .44</td>
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</tr>
<tr>
<td>Full metric</td>
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<td>.15&lt;sup&gt;a&lt;/sup&gt; .72</td>
<td>.13&lt;sup&gt;a&lt;/sup&gt; .42</td>
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<tr>
<td><strong>Adaptability</strong></td>
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<td></td>
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<tr>
<td>Subscale scores</td>
<td>.44 .48 .53</td>
<td>.22 .51</td>
<td>.29 .41</td>
<td></td>
</tr>
<tr>
<td>LMACS models:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>.50 .48 .62</td>
<td>.19 .61</td>
<td>.35 .46</td>
<td></td>
</tr>
<tr>
<td>Full metric</td>
<td>.49 .48 .62</td>
<td>.20 .60</td>
<td>.33 .45</td>
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</tr>
</tbody>
</table>

Note. N = 392. C5 = Cycle 5 (age 10-11); C6 = Cycle 6 (age 12-13); C7 = Cycle 7 (age 14-15); C8 = Cycle 8 (age 16-17).

<sup>a</sup> Non-significant correlation (p > .05)
Table B4

Temporal Stability Coefficients (Autocorrelations) for the EQi:YV-Brief Subscale Scores and their Corresponding LMACS Latent Factors in the Female Group

<table>
<thead>
<tr>
<th>Estimate</th>
<th>1st order</th>
<th>2nd order</th>
<th>3rd order</th>
<th>Mean r</th>
</tr>
</thead>
<tbody>
<tr>
<td>C5/C6</td>
<td>C6/C7</td>
<td>C7/C8</td>
<td>C5/C7</td>
<td>C6/C8</td>
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<tr>
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<td>.25 .27 .16</td>
<td>.32 .</td>
<td></td>
</tr>
<tr>
<td>LMACS models: Baseline</td>
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<td>.26 .27 .20</td>
<td>.34</td>
<td></td>
</tr>
<tr>
<td>Full metric</td>
<td>.28 .43 .61</td>
<td>.27 .26 .19</td>
<td>.34</td>
<td></td>
</tr>
<tr>
<td>Interpersonal Subscale scores</td>
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<td>.26 .47 .28</td>
<td>.32</td>
<td></td>
</tr>
<tr>
<td>LMACS models: Baseline</td>
<td>.28 .22 .65</td>
<td>.48 .65 .32</td>
<td>.43</td>
<td></td>
</tr>
<tr>
<td>Full metric</td>
<td>.27 .20 .66</td>
<td>.41 .65 .31</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>Stress Management Subscale scores</td>
<td>.25 .39 .49</td>
<td>.28 .39 .31</td>
<td>.35</td>
<td></td>
</tr>
<tr>
<td>LMACS models: Baseline</td>
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<td>.35 .46 .41</td>
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</tr>
<tr>
<td>Partial metric</td>
<td>.31 .46 .59</td>
<td>.34 .47 .41</td>
<td>.43</td>
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</tr>
<tr>
<td>Full metric</td>
<td>.32 .45 .58</td>
<td>.33 .47 .39</td>
<td>.42</td>
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</tr>
<tr>
<td>Adaptability Subscale scores</td>
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<td>.21 .28 .28</td>
<td>.32</td>
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<tr>
<td>LMACS models: Baseline</td>
<td>.50 .30 .62</td>
<td>.22 .33 .36</td>
<td>.39</td>
<td></td>
</tr>
<tr>
<td>Full metric</td>
<td>.48 .29 .61</td>
<td>.23 .32 .35</td>
<td>.38</td>
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</tbody>
</table>

Note. N = 381. All autocorrelations are significant (p < .05). C5 = Cycle 5 (age 10-11); C6 = Cycle 6 (age 12-13); C7 = Cycle 7 (age 14-15); C8 = Cycle 8 (age 16-17).
Table B5

Gender Differences in the EQi:YV-Brief Subscale Score Means and the Corresponding LMACS Latent Factor Means at Each Cycle

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<td>$M_{Dif}$</td>
<td>$t$</td>
<td>$d$</td>
<td>$M_{Dif}$</td>
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<tr>
<td><strong>Intrapersonal</strong></td>
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<tr>
<td>Subscale scores</td>
<td>-0.42</td>
<td>-2.44*</td>
<td>-.18</td>
<td>-0.23</td>
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<tr>
<td>LMACS models:</td>
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<td></td>
</tr>
<tr>
<td>Full scalar</td>
<td>-0.21</td>
<td>-2.94*</td>
<td>-.21</td>
<td>-0.14</td>
</tr>
<tr>
<td>Partial scalar</td>
<td>-0.21</td>
<td>-3.00*</td>
<td>-.22</td>
<td>-0.14</td>
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<tr>
<td><strong>Interpersonal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subscale scores</td>
<td>-1.14</td>
<td>-7.83*</td>
<td>-.56</td>
<td>-1.06</td>
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<tr>
<td>LMACS models:</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Full scalar</td>
<td>-0.88</td>
<td>-8.09*</td>
<td>-.58</td>
<td>-0.84</td>
</tr>
<tr>
<td>Partial scalar</td>
<td>-0.83</td>
<td>-7.35*</td>
<td>-.53</td>
<td>-1.04</td>
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<tr>
<td><strong>Stress Management</strong></td>
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<td></td>
</tr>
<tr>
<td>Subscale scores</td>
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<td>-2.10*</td>
<td>-.15</td>
<td>-0.55</td>
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<tr>
<td>LMACS models:</td>
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<td></td>
</tr>
<tr>
<td>Full scalar</td>
<td>-0.17</td>
<td>-2.12*</td>
<td>-.15</td>
<td>-0.29</td>
</tr>
<tr>
<td>Partial scalar</td>
<td>-0.11</td>
<td>-1.41</td>
<td>-.10</td>
<td>-0.19</td>
</tr>
<tr>
<td><strong>Adaptability</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Subscale scores</td>
<td>0.56</td>
<td>3.43*</td>
<td>.25</td>
<td>0.85</td>
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<tr>
<td>LMACS models:</td>
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<tr>
<td>Full scalar</td>
<td>0.26</td>
<td>3.47*</td>
<td>.25</td>
<td>0.39</td>
</tr>
<tr>
<td>Partial scalar</td>
<td>0.16</td>
<td>2.24*</td>
<td>.16</td>
<td>0.42</td>
</tr>
</tbody>
</table>

Note. $M_{Dif}$ = mean difference between boys and girls, with positive sign denoting higher mean for boys (subscale scores are on a 0 to 9 scale; LMACS estimates are on a 1 to 4 scale). a Results for Stress Management may not be interpretable. * $p < .05$
## APPENDIX C

### Study 2: MLGM Results by Gender

### Table C1

Model-Fit Results for Single-Domain MLGMs in the Male Group

<table>
<thead>
<tr>
<th>Model</th>
<th>df</th>
<th>$\chi^2$</th>
<th>RMSEA (90% CI)</th>
<th>AIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intrapersonal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero growth</td>
<td>50</td>
<td>205.39*</td>
<td>.089 (.077, .102)</td>
<td>105.39</td>
</tr>
<tr>
<td>Linear growth</td>
<td>47</td>
<td>185.02*</td>
<td>.087 (.074, .100)</td>
<td>91.02</td>
</tr>
<tr>
<td>Quadratic growth</td>
<td><strong>43</strong></td>
<td><strong>167.72</strong>*</td>
<td>.086 (.073, .100)</td>
<td><strong>81.72</strong></td>
</tr>
<tr>
<td><strong>Interpersonal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero growth</td>
<td>48</td>
<td>211.19*</td>
<td>.093 (.080, .106)</td>
<td>115.19</td>
</tr>
<tr>
<td>Linear growth</td>
<td>45</td>
<td>188.07*</td>
<td>.090 (.077, .103)</td>
<td>98.07</td>
</tr>
<tr>
<td>Quadratic growth</td>
<td>a</td>
<td>162.76*</td>
<td>.084 (.071, .098)</td>
<td>76.76</td>
</tr>
<tr>
<td><strong>Adaptability</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero growth</td>
<td>49</td>
<td>184.02*</td>
<td>.084 (.071, .097)</td>
<td>86.02</td>
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<tr>
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<td>46</td>
<td>157.90*</td>
<td>.079 (.065, .092)</td>
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<tr>
<td>Quadratic growth</td>
<td>b</td>
<td>131.30*</td>
<td>.072 (.058, .087)</td>
<td>45.30</td>
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</tbody>
</table>

*Note.*** $N = 392$. Bolded = best-fitting model.***

a Variances of the first-order factor residuals at Cycles 5 and 8 were set to 0 to allow for convergence.

b Variance of the first-order factor residual at Cycle 5 was set to 0 to allow for convergence. * $p < .05$
Table C2

Model-Fit Results for Single-Domain MLGMs in the Female Group

<table>
<thead>
<tr>
<th>Model</th>
<th>df</th>
<th>$\chi^2$</th>
<th>RMSEA</th>
<th>(90% CI)</th>
<th>AIC</th>
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</thead>
<tbody>
<tr>
<td><strong>Intrapersonal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Zero growth</td>
<td>50</td>
<td>197.77*</td>
<td>.088</td>
<td>(.075, .101)</td>
<td>97.77</td>
</tr>
<tr>
<td>Linear growth</td>
<td>47</td>
<td>140.63*</td>
<td>.072</td>
<td>(.059, .086)</td>
<td>46.63</td>
</tr>
<tr>
<td>Quadratic growth $^a$</td>
<td>44</td>
<td>124.34*</td>
<td>.069</td>
<td>(.055, .084)</td>
<td>36.34</td>
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<tr>
<td><strong>Interpersonal</strong></td>
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<tr>
<td>Zero growth</td>
<td>48</td>
<td>233.89*</td>
<td>.101</td>
<td>(.088, .114)</td>
<td>137.88</td>
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<td>Linear growth $^a$</td>
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<td>198.38*</td>
<td>.093</td>
<td>(.080, .107)</td>
<td>106.37</td>
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<td>196.28*</td>
<td>.094</td>
<td>(.081, .108)</td>
<td>106.28</td>
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</tr>
<tr>
<td>Zero growth</td>
<td>49</td>
<td>197.49*</td>
<td>.089</td>
<td>(.076, .102)</td>
<td>99.49</td>
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<tr>
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<td>175.82*</td>
<td>.086</td>
<td>(.073, .100)</td>
<td>83.82</td>
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<tr>
<td>Quadratic growth $^c$</td>
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<td>146.62*</td>
<td>.078</td>
<td>(.065, .093)</td>
<td>58.62</td>
</tr>
</tbody>
</table>

* $p < .05$

**Note.** $N = 381$. Bolded = best-fitting model. $^a$ Variance of the first-order factor residual at Cycle 8 was set to 0 to allow for convergence. $^b$ Variance of the first-order factor residual at Cycle 8 and variance and covariances of the quadratic growth factor were set to 0 to allow for convergence. $^c$ Variances of the first-order factor residuals at Cycles 5 and 8 were set to 0 to allow for convergence.
Table C3

Standardized Correlations among the Latent Factors from the Correlated Multiple-Group MLGM by Gender

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<thead>
<tr>
<th></th>
<th>Intercepts</th>
<th>Linear Slopes</th>
<th>Quadratic Slopes</th>
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<td>INTER</td>
<td>ADAP</td>
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<td>.62*</td>
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<tr>
<td>INTER</td>
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<td>Linear Slopes</td>
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<td>INTRA</td>
<td>.65*</td>
<td>.49*</td>
<td>.41*</td>
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<td>.39*</td>
<td>.84*</td>
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<td>.48*</td>
<td>.49*</td>
<td>.59*</td>
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<tr>
<td>Quadratic Slopes</td>
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<td>INTRA</td>
<td>.62*</td>
<td>.53*</td>
<td>.37*</td>
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<td>INTER</td>
<td>.31*</td>
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<td>.12</td>
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<tr>
<td>ADAP a</td>
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<td>0</td>
<td>0</td>
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</table>

*Note. Correlations in the male group are below diagonal, in the female group are above diagonal. INTRA = Intrapersonal; INTER = Interpersonal; ADAP = Adaptability. a Variance and covariances of the quadratic slope factor were set to zero in the male group to allow for convergence. *p < .05*