Structure and Change in Self-Concept During Adolescence

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Abstract

We investigated the longitudinal changes in multiple domains of self-concept over a two-year period, for 518 high school students, using a multioccasion-multicohort design. We were interested in identifying gender and age effects, as well as in examining the hierarchical nature of self-concept by determining the domains of self-concept that are most predictive of one's overall sense of self-worth. Using Harter's Self-Perception Profile, we found that most domains of self-concept increase with age, although perceived scholastic competence decreases. There were several gender differences, all of which replicated known discrepancies in the literature. In addition, perceptions of appearance were most closely tied to general self-worth, and this pattern was stable over time. As well, we found that current and changing levels of the various domains of self-concept were the best predictors of change that occurred in overall self-worth. Finally, we found that weighting the various domains of self-concept by the importance that each individual places on that domain did not improve the predictive power of specific domains to general self-worth.

Résumé

Nous avons examiné les changements longitudinaux dans plusieurs domaines du concept de soi pendant une période de deux ans, auprès de 518 étudiants de niveau secondaire à l'aide d'une conception multicohorte à occasions multiples. Nous cherchions à identifier les effets du sexe et de l'âge, ainsi qu'à examiner la nature hiérarchique du concept de soi, en établissant les domaines du concept de soi qui sont les plus susceptibles de prédire le sentiment global de confiance en soi qu'éprouve une personne. Au moyen du profil de perception de soi de Harter, nous avons découvert que la plupart des domaines du concept de soi se renforcent avec l'âge, même si les compétences scolaires perçues décroissent. Nous avons observé plusieurs différences entre les filles et les garçons, qui reproduisaient tous les écarts connus dans les ouvrages scientifiques sur le sujet. En outre, les perceptions relatives à l'apparence étaient les plus étroitement reliées à la confiance en soi et ce modèle était stable au fil du temps. De plus, nous avons constaté que les niveaux actuels et changeants des divers domaines du concept de soi étaient les meilleurs prédicteurs du changement qui se produit dans la confiance en soi globale. Pour finir, nous avons découvert que, en pondérant les divers domaines du concept de soi avec l'importance qu'attribue chaque personne à ce dernier, nous ne voyions pas une amélioration de l'efficacité prédictive de domaines particuliers sur la confiance en soi globale.

Self-evaluations influence the kinds of activities one engages in, the effort and motivation expended, and the likelihood of future perseverance in that activity. Much attention has been focused on elucidating exactly how self-perceptions influence different kinds of outcomes – including both direct and indirect links (e.g., Cairns, McWhirter, Duffy, & Barry, 1990; Harter, 1999; Marsh, 1989; Marsh & Hattie, 1996). There continue to be gaps, however, in our understanding of gender differences, age-related changes, and the relationship between different domains of self-evaluation (Crain, 1996). Laying out this basic groundwork is a necessary step before other substantive questions can be adequately addressed. This goal is particularly paramount for adolescent development. Given the hypothesized links between low self-concept and maladaptive outcomes (such as low academic achievement and depression), in conjunction with the heightened salience of self-perceptions for adolescents, this age group is often viewed as the most susceptible to the negative ramifications associated with low self-esteem (Harter; Marsh). This study thus utilizes Harter's Self-Perception Profile to provide an empirical understanding of how self-concept changes over the course of high school, as a function of gender and age. In addition, we attempt to identify the stability and change in the hierarchical structure of self-concept, and to understand the developmental mechanisms underlying self-concept instability.

Until recently, dominant practice has been to measure self-concept using a single score, derived either

by summing or averaging positive or negative perceptions of worth across several facets of life (Marsh & Hattie, 1996). However, Wylie's work (Wylie, 1979) clearly showed that aggregations across domains of self-concept are not appropriate because they do not incorporate individual differences in the valuing and weighting of each domain. For example, low perceptions of self-worth in a particular domain may not be debilitating to overall self-worth if the person has discounted the importance of that realm of life (Harter, 1999). Recent research has emphasized the limitations of global self-esteem scores, which do not provide an accurate representation of a person's general sense of himself (Cairns et al., 1990; Harter). Current evidence suggests that self-perceptions are much more complex and consist of varying perceptions across several dimensions. More recent research, therefore, examines self-concept from a multifaceted, domain-specific perspective, with several domains of evaluation, ranging from physical appearance and athletic competence to academic perceptions and job competence (Harter; Marsh, 1989).

In exploring the development of the various domains of self-concepts across early childhood and adolescence, it has been shown that as children's minds become increasingly flexible with each developmental milestone, their perceptions of themselves become increasingly differentiated and comprehensive (Harter, 1996, 1999; Marsh, 1989; Marsh & Shavelson, 1985; Stipek & MacIver, 1989). It appears that very young children are capable only of evaluating themselves in terms of five domains: physical competence, physical appearance, peer acceptance, cognitive competence, and behavioural conduct (Harter, 1983, 1996, 1999). Young children do realize that their ability and skills differ by situation (Harter, 1999; Marsh), but within each domain, they tend to have dichotomous views about their ability – that they are either good or bad. In contrast, older children and adults rate themselves along a continuum, for example, from very good to very bad (Stipek & MacIver).

Harter's work (Harter, 1983, 1996, 1999) has shown that by middle childhood, children are able to comprehend both a general or global sense of themselves, along with domain-specific evaluations in the five areas noted above. However, it should be reiterated that general self-worth is not an additive domain, nor an average across domains, but an independent domain of evaluation. With increased cognitive capacity, adolescents and college-aged individuals display further differentiation of the five initial areas of self-perceived competence. For example, cognitive competence is eventually delineated into scholastic competence, intellectual ability, and creativity. As well, job competence, close friendships, and romantic relationships become separate domains within social competence (for a review, see Harter, 1999).

The first major goal of this study is to identify how the domains of self-competence change within the adolescent period (as opposed to between developmental periods such as childhood to adolescence or adolescence to young adulthood) for each gender. The changes occurring in self-concept during the adolescent years are particularly poorly understood (Marsh, 1989, 1998). Historically, the prevailing view was that this was a time of storm and stress. This view led to assumptions about the stability of adolescent self-perceptions, namely, that they are relatively unstable and susceptible to dramatic, debilitating changes. More recent research, however, has moderated this view to a large extent, showing that adolescence is not as developmentally turbulent as initially suspected (Crain, 1996). Instead, it is suggested that changes in self-perceptions appear to evolve gradually and in minor increments (Cairns et al., 1990; Crain; Dusek & Flaherty, 1981; Marsh, 1989; Savin-Williams & Demo, 1984). It appears that many of the domains of self-concept drop during early adolescence and then rebuild slowly during later adolescence, in a flat, u-shaped pattern (Harter, 1998).

Unfortunately, few methodologically sound, longitudinal studies exist that look at this question (Cole, et al., 2001; Crain, 1996). The preponderance of studies examining age and gender differences have tended to utilize an averaged or summative global self-concept, which as noted above, is limited in its explanatory power (Crain; Marsh, 1998). Thus, it has been argued that few substantive statements can be made about age effects of multidimensional self-concepts of adolescence due to the reliance on global measures of self-concept, which may have masked substantial fluctuation within specific domains of self-concept (Crain; Marsh, 1989). It is clear, however, that identifying age-related and gender-related differences in the development of self-perceived competence has both theoretical and practical importance. For example, applying effective age-appropriate and gender-appropriate educational and clinical interventions for individuals who may be at risk for low self-esteem, depends on a better understanding of the course of development. The current study will begin to rectify this gap in the literature.

With respect to gender differences, there tends to be consensus that most differences exist not at the general or global level of self-worth, but in stereotypical domains (Crain, 1996; Harter, 1999; Marsh, Craven, & Debus, 1998). For example, boys tend to

have a higher physical self-conception (Cole et al., 2001; Harter; Marsh et al., 1998), whereas girls tend to have higher self-conceptions in social domains (Harter; Marsh, 1989). Very few studies have examined gender differences in the development of self-concept – that is, in how self-concepts change differentially over time for girls and boys. In fact, in a review of this literature, it was argued that "much of the literature on differences between boys' and girls' self-concepts is ambiguous, inconsistent, and methodologically inadequate" (Crain, p. 409). In the current study, we examined differences not only in levels of self-concepts at specific points in time, but also in patterns of change. For example, given that girls go through puberty, on average, 18 months earlier than boys (Brooks-Gunn & Reiter, 1990), it is possible that the domain of physical appearance becomes more salient and more vulnerable to fluctuation at earlier ages for girls than for boys. To our knowledge, this has not been explored previously.

The Hierarchical Nature of Self-Concept

Several theorists have attempted to define the relationship between global self-concept and the specific domains (for reviews, see Harter, 1999; Marsh & Hattie, 1996). It appears that, in addition to being multidimensional, self-concepts are hierarchical in nature, with general self-concept at the apex and the various domains, or subcategories of domains, fanning out below (Harter; Marsh, 1989; Marsh & Hattie; Shavelson, Hubner, & Stanton, 1976). Additionally, research suggests that certain domains are more predictive of global self-worth than others (Harter). For instance, physical appearance tends to be most closely tied to global self-worth whereas athletic competence is least likely to be correlated with one's overall sense of self. Social acceptance, scholastic competence, and moral conduct tend to be moderately predictive. In a review of the relevant research, Harter notes that this pattern of findings has been identified across various studies from several different countries. One goal of the present study is to extend this finding by examining whether this pattern holds when predicting longitudinal *change* in global self-concept across high school, and to see if the pattern is similar for girls and boys.

Several researchers have suggested that there is an additional explanatory factor of general self-worth that is lacking in the hierarchical model described above (Harter, 1999; Marsh & Hattie, 1996). These theorists argue that the relation between global and domain-specific ratings of self-worth is a function of the importance an individual places on each domain. More specifically, it has been shown that general self-

worth can differ for two individuals who have similar profiles of competence ratings (Harter). This difference stems from distinct valences placed on each domain – with larger discrepancies between valence and perceived competence associated with bigger decrements to overall self-worth. That is, it was found that the individuals with the lowest self-worth were those who rated themselves poorly in domains that they placed high importance on, and who were unable to discount that domain (Harter).

Thus, it appears that it is the discrepancy between the value of a domain and the perceived competence in that domain that may be more explanatory than self-perceived competence ratings alone. The final goal of the current study is to examine this hypothesis by assessing not only the degree to which the personal salience of different domains matters to overall self-worth, but the impact of personal salience of each domain to the *changes* occurring in general self-worth during adolescence.

The Current Study

To reiterate, we undertook this study to address three main questions. First, how does self-concept change over the course of high school, and does it change differentially for boys and girls? Although most previous studies have used cross-sectional data, we expected our data to reflect the growing trend that most domains of self-concept increase during the latter years of high school (Harter, 1998). In addition, we hypothesized that gender differences would be consistent with gender stereotyping. More specifically, that boys would have higher perceptions of physical appearance and athletic competence and that girls would have higher perceptions in social domains. Previous research has shown that once gender differences emerge in elementary school (Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002), they tend to be stable. Given this, we did not expect any gender by age interactions.

It has been argued that to appropriately examine age-related changes in self-concept, multicohort-multioccasion designs, which measure multiple facets of self-concept, are required (Marsh 1998; Marsh et al., 1998). The current study employs such a design. We measured several domains of self-concept using a longitudinal sample of high school students of different ages. We followed two grade cohorts over a period of two years. This afforded us the opportunity to examine both actual changes over time, as well as any additional grade/cohort-related changes. This provides a stronger basis for evaluating interindividual age-related differences, as well as intraindividual stability.

The second question of this study was intended to elucidate the factors that are most predictive of a student's general self-worth. More specifically, we investigated whether the salience of different domains to overall self-worth is a stable or changing function over the course of high school. Previous research has shown that perceptions of appearance are the most predictive of overall self-worth (Harter, 1999). We expected to find this when we examined the hierarchical nature of self-worth at each point in time. However, our main focus was in predicting how this pattern changed over the course of high school. Since we expected all of the domains of self-concept to increase, we would expect the hierarchical nature of self-concept to be stable over the course of high school.

Finally, we investigated whether individually weighted domains of self-worth better explained changes in general self-concept. That is, whether the best prediction of general or global self-concept comes from an interaction of the specific domains and importance of those domains (e.g., Marsh & Hattie, 1996). In other words, the correlations between these interaction terms and general self-worth should be higher than the comparable correlations between general self-worth and competence ratings. Research in this area has been mixed and has relied almost exclusively on cross-sectional data. The current study not only helps clarify this question, but extends our understanding by looking at the relationship between the self-rated importance of domains and subsequent *change* in general self-concept (Harter, 1999; Marsh & Hattie).

Method
Participants and Procedures

Participants for this study were drawn from an ongoing longitudinal study involving two public high schools (Grades 9-13) in Ontario, Canada. The two schools were chosen based on their demographic similarity. That is, both schools were located in the same suburban area, were in the same school board jurisdiction, and the students were from predominately middle or upper middle class white families. Several analyses were conducted to ensure the comparability of the two schools (see Section 1 of Results), to show that students from the two schools did not differ on several key psychological and demographic variables or on the variables pertinent to this study.

Data for this study were collected using a questionnaire that was group-administered to students during their first period class (Time 1), and then again two years later (Time 2), separately for each school. The questionnaire included questions and scales aimed at identifying motivational and personality factors deemed to impact adolescent achievement. Most students were able to complete the questionnaire within the allocated hour. To ensure consistency, the vice principal at each school introduced the study and read the instructions over the school's public address system. Prior to completing the questionnaire, students were required to fill out a consent form in which they provided their name and signature, confirming their agreement to participate. Less than 2% of the students chose not to participate in the study. It should be noted that parental consent was not required as all of the participants were aged 14 or older and there were no items on the questionnaire that were deemed sensitive for this age group.

Every student who was in attendance for both Time 1 and Time 2 questionnaire administration days, formed the subject pool for this study. At Time 1 of the study, all students were in Grade 9 or 10. At Time 2, these participants were in Grade 11 or 12. The final longitudinal sample included 102 girls and 131 boys from the first school, as well as 149 girls and 136 boys from the second school.

Measures

Demographic measures. Because participants were drawn from two schools, our preliminary analyses were undertaken to ensure no school differences existed. We examined every variable used in this study, as well as three other demographic and school-related variables, which included parental education, perceived levels of parental expectations, and pre-high school academic achievement. Parental education was derived from self-reported information where students were asked to identify the highest level of education that each of their parents and/or step-parents had attained (elementary school, high school, some college/university, bachelor's degree, or a graduate/professional degree). For each student, an average level of parental education was calculated from all parents identified at both phases of the study. Perceived parental expectation was a composite variable comprising three questionnaire items pertaining to how supportive students felt their parents were (How important is it for your parents that you do well in school? How upset would your parents be with a low mark? Are you currently doing as well as your parents expect?) Each of these questions was responded to using a 7-point Likert scale. A composite was created by taking the average of these three items. Finally, pre-high school achievement was students' average levels of achievement in Grades 7 and 8, which are the two years prior to entering high

school. These grades were obtained from student records.

Self-concept measures. At both phases of the study, all students completed, among other instruments, the Harter Self-Perception Profile for College Students. This profile includes a measure of general self-worth, along with 12 subscales, each measuring self-perceived competence in specific cognitive, social, or physical domains. Although students were given the college-aged version of the Harter scales, only those subscales pertinent to adolescence were used. It is important to note that for the subscales included in both the adolescent and college version of the perception profile, the items were identical (Keith & Bracken, 1996).

The scoring of scales was in accordance with the Harter (1988) manual for scoring. To maintain sample size, students were included if they had answered at least half of the items for each variable. For each scale, the percent of cases where there were missing values was between 0% and 5.2%. To obtain measures of change, we used standardized regression residuals. For each domain of self-concept (including general self-worth), Time 2 scores were regressed on Time 1 scores. The standardized residuals were saved and used as the outcome measure in later analyses.

Residualized change scores can be thought of as Time 2 measures controlled for their Time 1 level, or the amount of variance left over at Time 2, after accounting for initial levels. By creating residualized change scores, we removed the stability in each measure, and utilized only the variance that is explained by factors other than the Time 1 measure. It should be noted that in determining the appropriate measure of change for two-wave data, we followed the recommendations of Zumbo (1999) and Williams and Zimmerman (1983). Specifically, according to Zumbo, if the Wave 1 and Wave 2 standard deviations are equal, then residualized change scores are appropriate. We utilized Levene's test for homogeneity of variance and found that there were no significant differences in Time 1 and Time 2 standard deviations. In addition, as recommended by Williams and Zimmerman, we ensured that the correlations of Time 1 and Time 2 measures were less than the ratio of the Time 1 and Time 2 standard deviations. Finally, as an extra precaution, we ensured that there were no outlying data (as OLS regression is sensitive to outliers). As well, we examined q-plots of the data to ensure normality.

To obtain a measure of the importance students placed on each domain of self-concept, we used Ford's (1992) measure of life-course goals. At both Time 1 and Time 2, respondents were required to rank 12 goals from most important to least important. These goals related to the relative importance of a) having a close relationship, b) succeeding academically, c) obtaining a good job, or d) having lots of friends. The 12 goals spanning these four categories were ranked, and, for each category, the mean of the relevant goals was obtained. This procedure was done after reverse coding the goal rankings such that higher numbers reflected greater importance. Standardized change scores were then created in the same manner as for the self-concept change scores (standardized residuals of the regressions of Time 2 on Time 1). For the two remaining domains of self-concept, athletic competence and appearance, we used questionnaire items that asked respondents to rate how important appearance and sports are to them, on a 1 to 7 Likert scale. For both of these, in similar fashion to the other measures, residualized change scores were developed by regressing Time 2 responses on Time 1 responses.

Results

School Differences

Recall that participants were drawn from one of two schools; thus, before running any analyses, we ensured that there were no school differences. To do this we first ran a series of t-tests to verify that no school differences existed for any of the variables in this study. There were no mean differences between schools for any domain of self-concept or importance rating at Time 1 or Time 2. In addition, we ran t-tests examining school differences on three demographic and school-related variables: parental education, perceived parental expectations, and pre-high school achievement. No differences were found for any of these variables.

Age and Gender Effects

The first set of analyses examined change in each domain of self-concept (including overall self-worth) as a function of gender and grade. A series of repeated measures analyses of variance (ANOVA) were conducted to examine this question. For each repeated measures ANOVA, the within-person variable was time, as expressed by the Time 1 and Time 2 measures of each domain of self-concept. The two between-subject factors were gender and grade. All of the analyses are summarized in Table 1.

It should be noted that we did initially include school in the repeated analyses as a between-subjects factor to further ensure that no school differences existed. Similar to the t-tests, we found no main effects for this variable on any of the domains of self-

TABLE 1
Means and Statistics for Repeated Measures ANOVAs Examining Change in Self-Concept as a Function of Grade and Gender

Self-Concept	Adjusted Means (and Standard Error), F-tests, and Eta Squareds					
	Gender				Time	
	Boys	Girls	$F(1, 418)$	Time 1	Time 2	$F(1, 418)$
Appearance	2.66	2.29	29.60***	2.45	2.50	
	(0.05)	(0.05)	$\eta^2 = 0.06$	(0.04)	(0.04)	
Athletic Competence	3.09	2.54	46.36***	2.82	2.81	
	(0.06)	(0.06)	$\eta^2 = 0.10$	(0.04)	(0.04)	
Close Friendship	3.11	3.34	18.31***	3.16	3.28	12.19***
	(0.04)	(0.04)	$\eta^2 = 0.04$	(0.03)	(0.03)	$\eta^2 = 0.03$
Job Competence	3.14	3.09		3.06	3.18	12.44***
	(0.03)	(0.03)		(0.03)	(0.03)	$\eta^2 = 0.03$
Scholastic Competence	2.98	2.93		3.02	2.88	19.10***
	(0.04)	(0.04)		(0.03)	(0.03)	$\eta^2 = 0.04$
Social Acceptance	2.99	3.28	6.66**	2.98	3.18	25.67***
	(0.04)	(0.04)	$\eta^2 = 0.02$	(0.04)	(0.04)	$\eta^2 = 0.06$
Romantic Relationships	2.39	2.43		2.32	2.50	17.76***
	(0.05)	(0.05)		(0.04)	(0.04)	$\eta^2 = 0.04$
General Self-Worth	2.99	2.91		2.96	2.94	
	(0.04)	(0.04)		(0.03)	(0.03)	

Note. There were no significant main effects for grade; therefore, the adjusted means are not presented here. The interactions are presented in Figure 1 and Figure 2.
*$p < .05$; **$p < .01$; ***$p < .001$.

concept. There was one interaction effect between school and gender for the domain of romantic relationships (with girls at one school having higher self-concepts in this domain and boys at the other school having, on average, higher romantic relationship self-concepts). However, the inclusion or omission of school as a variable (or covariate) in the repeated measure ANOVA for romantic relationships did not change the pattern of results for the variables of interest (gender and age); thus, we concluded that this interaction did not pose a serious threat to the cross-school generality of results. Based on this and on the null findings from all of the other domains of self-worth, we collapsed students across schools for all further analyses.

Regarding gender effects, as can be seen in Table 1, there were significant gender differences for the domains of appearance and athletic competence (with boys having higher perceptions), and close friends and social acceptance (with girls rating their competence levels higher). Regarding grade or cohort effects (whether participants were in Grade 9 vs. Grade 10 at Time 1), no differences were found for any domain of self-concept, suggesting that cross-sectionally, there were no differences in self-concept for participants who were only one grade apart.

However, in examining longitudinally the within-person changes over two years (spanning from Grades 9 to 11 or Grades 10 to 12), there were significant changes in self-perceptions for most outcomes over the two-year measurement period. The only domains where time was not a significant factor were self-perceived athletic competence, appearance, and general self-worth. For the domains of close friendships, job competence, romantic relationships, and social acceptance, students' self-perceived competence increased over the course of high school. For self-perceived scholastic competence, however, students' self-ratings declined over the course of high school.

Two significant two-way interactions and one significant three-way interaction were found. For general self-worth, although there was no main effect for time, the interaction of time and gender was significant, $F(1, 418) = 4.09$, $p < .05$. As illustrated in Figure 1, boys' perceived competence levels dropped over the course of the study, while girls' levels of general self-worth rose. In addition, there was a significant two-way interaction for self-perceived scholastic competence of time by grade, $F(1, 418) = 6.0$, $p < .05$. Figure 2 shows that while perceived levels of competence are decreasing for both groups of students, the decrease is more pronounced for the younger cohort. That is, there is a larger decrease in perceived scholastic competence as students go from Grades 9 to 11 than for the period encompassing Grades 10 to 12. Note, however, that combining the cohort and the longitudinal data reveals that there is a monotonic
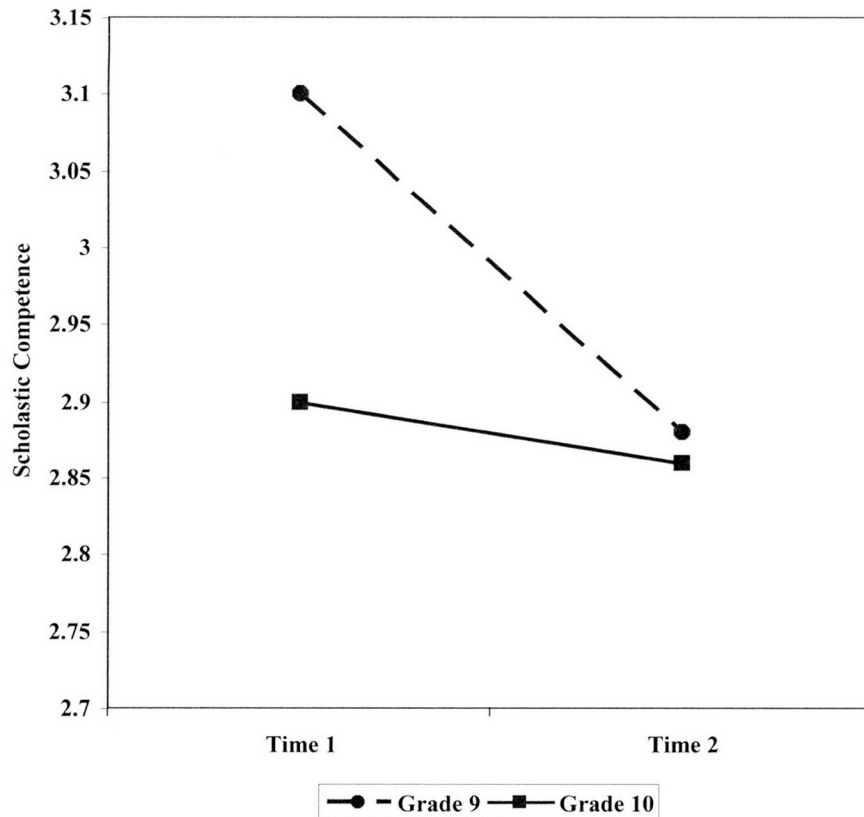
Figure 1. Means for self-perceived scholastic competence at Time 1 and Time 2 for each grade-level (9 and 10 at Time 1). Repeated measure ANOVA showed that the interaction between time and grade was significant for perceived scholastic competence ($p < .05$), showing that younger students' perceptions in this domain decrease by a larger amount than older students.

decline in self-perceived scholastic competence from Grade 9 to Grade 12. Finally, there was a significant three-way interaction of time, grade, and gender for changes in the perceptions of close friendships $F(1, 418) = 4.14$, $p < .05$. The pattern suggests that girls' perceptions in this domain tend to rise from Grades 9 to 11 as well as from Grades 10 to 12, whereas for boys, there does not appear to be a change in perceptions for earlier grades, but from Grades 10 to 12, there is an increase.

Predictors of General Self-Worth

The next set of analyses were done to examine the hierarchical nature of self-worth to determine the domains of self-concept that are most predictive of one's general or overall sense of self. In addition, our analyses aimed to establish whether this hierarchy was stable over time, and further, to identify what domains of self-worth (at single points and as they change) were associated with the changes in overall self-worth. To do this, we ran several sets of hierar-

chical regressions. For the first set of regressions, the criterion variable was general self-worth, at Time 1 and Time 2, respectively. For the next set of regressions, which looked at self-concept as it changed over time, the criterion variable was the residualized change score for general self-worth. Recall that residualized scores were created by regressing Time 2 measures of self-concept on Time 1 measures and saving the residual. Using residualized change scores is tantamount to controlling for initial levels of each measure. For example, when the Time 2 measure of general self-worth was regressed on the Time 1 measure, the amount of Time 2 variance explained (R^2) was 29%. This is the amount of stability in this variable, with the residual representing the amount of unexplained variance. This unexplained variance represents the change in self-worth from Time 1 to Time 2.

To identify which domains best predicted general self-worth, for each set of regressions, the domains of self-concept (athletic competence, close friendships,
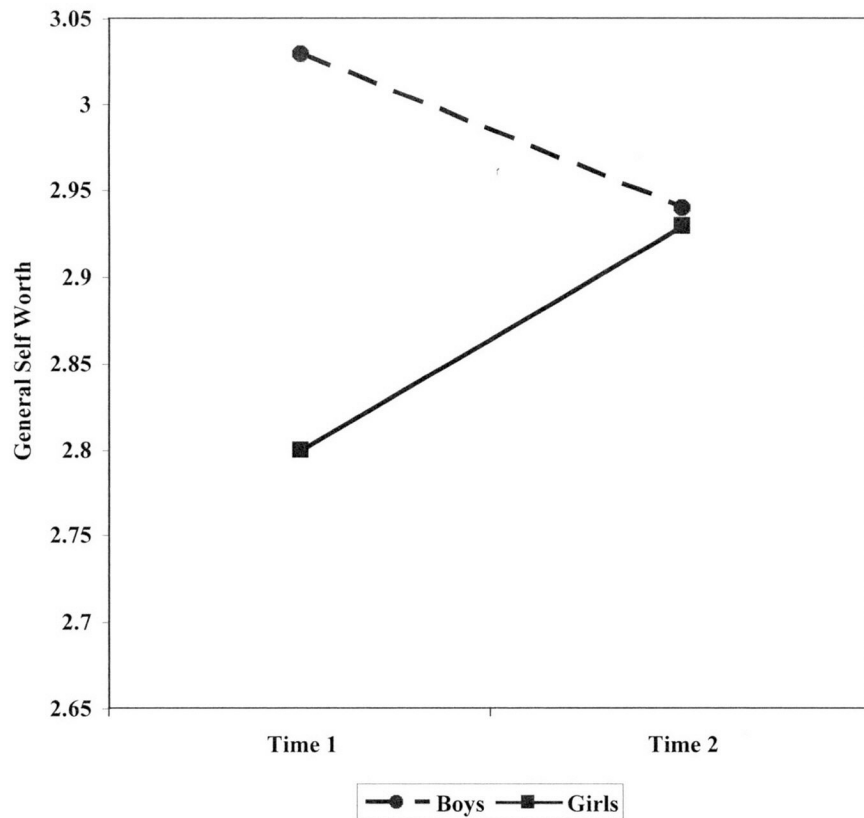
Figure 2. Means for general self-worth at Time 1 and Time 2 for each gender. Repeated measures ANOVA showed that the interaction between time and gender was significant for general self-worth ($p < .05$), showing that for girls, there is a slight increase in self-worth over time, whereas for boys there is a decrease.

job competence, romantic relationships, social acceptance, scholastic competence, and appearance) were entered into the model by systematically isolating one domain at a time. More specifically, in the first block of each regression, all but one domain of self-concept were entered, then, in the second block, the remaining domain was entered. Thus, each regression model isolated one domain of self-worth in order to identify whether it significantly added to the prediction of the general self-worth, over and above the other domains.

We also examined whether the isolated domains predicted overall self-worth differently for each gender. To do this, for each of the set of regressions described above, after the domains of self-concept were entered in the first and second block, we entered gender in the third block (represented by a dummy variable), and finally, in the fourth block the interaction of the isolated domain and gender was entered. For all of the regressions described below, gender did not significantly add to the model, nor

did any of the gender by domain interactions, suggesting that the pattern of results is similar for both genders.

For the regressions of the Time 1 and Time 2 measures of self-concept, similar patterns were found at both time-points. As shown in Table 2, several domains of competence explained a significant amount of variance in general self-worth, with appearance being the strongest predictor of general self-worth at both Time 1 and Time 2 (explaining 9% and 11% of the variance, respectively). At Time 1, job competence, scholastic competence and social acceptance, and close friendships were also predictive of overall self-worth (in that order). At Time 2, the same additional domains of self-concept were predictive of self-worth, although scholastic competence and close friendships explained more variance than job competence and social acceptance.

For the next series of regressions, we were interested in predicting the change in general self-worth that participants experienced over the course of the study.

TABLE 2
Unique Contributions of Domains of Self-Concept on the Prediction of General Self-Worth at Time 1 and Time 2

Domain of Self-Concept (from most to least predictive)	Unique Contribution of Each Domain Time 1		
	R^2, Block 1	R^2, Block 2	Change in R^2
Appearance	.49	.58	.09***
Job Competence	.54	.58	.04***
Scholastic Competence	.55	.58	.03***
Social Acceptance	.55	.58	.03***
Close Friendship	.57	.58	.01**
Athletic Competence	.58	.58	.00
Romantic Relationships	.58	.58	.00
	Time 2		
	R^2, Block 1	R^2, Block 2	Change in R^2
Appearance	.40	.51	.11***
Scholastic Competence	.45	.51	.06***
Close Friendship	.47	.51	.04***
Job Competence	.49	.51	.02***
Social Acceptance	.50	.51	.01**
Romantic Relationships	.51	.51	.00
Athletic Competence	.51	.51	.00

Note. In Block 1 of each hierarchical regression, all of the other domains of self-concept were entered. In Block 2, the remaining, isolated domain was entered.
*$p < .05$; **$p < .01$; ***$p < .001$.

Thus, for these regression models, the criterion variable was the residualized change score of general self-worth. We ran three series of regressions to see whether Time 1, Time 2, or the change from Time 1 to Time 2 best predicted the change in self-worth. It is clear from the third section of Table 3, the change in overall self-worth was best predicted by the changes occurring in each domain (i.e., the residualized domain scores), explaining 45% of the variance, and by current (i.e., Time 2) domain measures (explaining 33% of the variance). The same pattern of influence was found for these regressions, with appearance being the strongest predictor, scholastic competence and close friendships being moderate predictors, and job competence and social acceptance explaining the least amount of variance. When the Time 1 domains of self-worth were examined, however, the domains did not provide any additional explanation for the changes occurring in overall self-worth, suggesting that once the stability in general self-worth has been removed, the stability of the domains of self-worth (i.e., the Time 1 measures) are also not predictive.

Weighted Measures as Predictors of the Change in General Self-Worth

The final analyses were undertaken to examine whether weighting the various domains of self-concept by the changes in amount of importance placed on them would better predict general self-worth. To do this we took the residualized change scores for each domain and multiplied them by the amount of importance each individual placed on that domain (again using residualized change scores of Time 2 importance levels regressed on Time 1 levels). Then, as suggested by Marsh and Hattie (1996), we ran a hierarchical linear regression, with residualized change score for general self-worth as the criterion variable. In the first block we entered the residualized change scores of competency ratings for each domain. In second block, the importance rating of each domain was entered. Finally, the interaction terms of valence and self-concept (the weighted measures) were entered into the model. The results of this regression clearly show that only the addition of the self-perceived competency ratings in the first block significantly adds to the prediction of general self-worth. The change in R^2 was not significant for any set of variables added after the first block. Moreover, this pattern did not differ when gender and age were entered as covariates.

It should be noted that we ran two additional regressions to ensure that there were no current or lagged effects between importance of self-concept and overall self-worth. In other words, we wanted to determine whether Time 1 levels or Time 2 levels of importance influenced the change in the contributions of specific domains to overall self-worth (which differs from the above model in that we were exam-

TABLE 3
Unique Contributions of Domains of Self-Concept (Time 1, Time 2, and the Change From Time 1 to Time 2) on the Prediction of the Change in General Self-Worth

Domain of Self-Concept (from most to least predictive)	Unique Contribution of Each Domain Time 1 Contributions		
	R^2, Block 1	R^2, Block 2	Change in R^2
Athletic Competence	.00	.01	.01[+]
Social Acceptance	.01	.01	.00
Scholastic Competence	.01	.01	.00
Appearance	.01	.01	.00
Job Competence	.01	.01	.00
Close Friendships	.01	.01	.00
Romantic Relationships	.01	.01	.00
	Time 2 Contributions		
	R^2, Block 1	R^2, Block 2	Change in R^2
Appearance	.38	.33	.07[***]
Scholastic Competence	.38	.33	.05[***]
Close Friendship	.46	.33	.04[**]
Social Acceptance	.47	.33	.01[*]
Job Competence	.46	.33	.01[+]
Athletic Competence	.47	.33	.00
Romantic Relationships	.48	.33	.00
	Residualized Change Contributions		
	R^2, Block 1	R^2, Block 2	Change in R^2
Appearance	.35	.45	.10[***]
Scholastic Competence	.37	.45	.08[***]
Close Friendship	.39	.45	.06[***]
Job Competence	.43	.45	.02[*]
Social Acceptance	.43	.45	.02[*]
Athletic Competence	.44	.45	.01
Romantic Relationships	.45	.45	.00

Note. In Block 1 of each hierarchical regression all of the other domains of self-concept were entered. In Block 2, the remaining, isolated domain was entered.
+$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$.

ining whether the *change* in importance ratings influenced the specific domain's contributions to overall self-worth). To do this, we ran the same regression model as above, but rather than weighting the various domains with the residualized change in importance, we weighted the domains first by their Time 1 ratings of importance and then by their Time 2 ratings. As with the previous model, only the first block of variables predicted general self-worth and this pattern did not differ for gender or grade.

Summary

Our first analyses examined gender and age effects in the various domains of self-concept over the course of high school. We found that boys had higher perceptions of appearance and athletic competence, while girls had higher perceptions of their close friendship abilities and social acceptance. Increases in perceptions were found for the domains of job competence, romantic relationships, social acceptance, and close friendships (although the increase was only experienced for boys in the latter two years of high school). Decreases in perceptions of scholastic competence were found, with the decrease being more pronounced from Grades 9 to 11. Finally, general self-worth increased for girls but decreased for boys.

We then ran regressions to examine the hierarchical nature of self-concept. These analyses clearly demonstrate that appearance is the most significant predictor of general self-worth for both boys and girls. Moreover, the pattern was consistent whether it was examined at specific points in time (i.e., Time 1 and Time 2) or as it changed over time. Finally, adding the importance weightings did not improve the prediction of general self-worth.

Discussion
Self-Concept as it Changes by Gender and Age
In the current study, we examined how self-con-

cept changes over two years during high school. We examined several domains of self-concept as they changed over time, and whether the change differed as a function of age and gender. There were several gender effects, and the patterns, as expected, were consistent with previous work. Specifically, boys had higher perceptions of their competence in the physical domains of appearance and athletic ability, whereas girls had higher perceptions of their competence in the social domains of close friendships and social acceptance. The growing number of studies, across several countries, exemplifying this pattern, highlights the need to better understand and address these inequalities. Additionally, the verification of these findings enables us to pinpoint our efforts to known deficiencies in self-concept. For example, curriculum reform could include mandates to ensure that in physical activities all efforts are taken to reduce a focus on appearances. Unfortunately, this is a much larger societal problem in that body image is influenced through media exposure. At the very least, at the school level, awareness can be raised and the climate could be designed to counteract the negative messages girls are receiving from other socializing agents.

For boys, ensuring appropriate opportunity for socialization, both with other boys and with girls, is important, especially considering that the domain of close friendships is a significant predictor of adolescents' overall sense of self, suggesting that deficiencies in this area (and we already know them to be below that of girls) may have significant ramifications for overall self-worth. Moreover, we found a three-way interaction between time, gender, and grade for close friendships, which showed that boys' perceptions of themselves in this domain were not only lower, but that they only experienced an increase in perceptions of close friendships in the latter high school years, while girls experienced increases across both early and late high school. This clearly suggests that we need to target interventions early in high school to ensure that boys develop better socialization skills. Given the potential linkages between social competencies and late onset aggression (Loeber & Stouthammer-Loeber, 1998), the importance of these types of interventions cannot be underestimated. While this study has helped us identify appropriate types and timings of interventions, future studies in this area need to extend these findings to nonnormative populations, to further hone our ability to appropriately direct both educational and clinical interventions.

In examining the data longitudinally, we used a multicohort-multioccasion design. This design provides cross-validation of cross-sectional comparisons and true longitudinal comparisons, thereby removing the possibility of potentially confounding cohort effects, and enhancing our ability to assess developmental change (Marsh, 1998). Our results showed that over one year there were no discernable changes in self-concept (as measured cross-sectionally). However, when examined over two years, students' perceptions in most of the domains of self-competence increased (close friendships, job competence, romantic relationships, and social acceptance increased over time; scholastic competence decreased over time; athletic competence, appearance, and general self-worth did not change significantly). Although the data for this study cannot confirm it (due to the length of time between measurement periods), the combined pattern of findings from the cross-sectional and longitudinal analyses suggest that one year is not long enough to detect differences in self-concept. This suggests that future studies looking at self-concept (or including it as a variable) should ensure that measurement periods are long enough to detect changes.

The findings from this study reflect current work in this area which suggests that changes in self-concepts during adolescence reflect a u-shaped curve, with increments after a stable period occurring at a very gradual rate (Cole et al., 2001; Harter, 1998). According to Harter, this increasing stability in self-concept reflects the fact that developmentally, adolescents' sense of self is becoming increasingly more integrated and consistent over time (Harter, 1988). In addition, according to Cole et al., the age range covered in this study is relatively free of dramatic biological (i.e., puberty), cognitive, or school transitions, which have been shown to be detrimental to self-perceived competencies (Eccles et al., 1993).

It is interesting that self-perceptions in scholastic abilities are the only area of competence that diminishes over time. This is compatible with the literature showing that as children progress through the educational system, the concern with rank ordering, competition, and focus on grades increases and is associated with a decrease in achievement motivation and the associated beliefs underlying these goal structures (Ames 1992; Anderman & Maehr, 1994). The interaction of grade and time for scholastic competence further contributes to this notion. We found that for younger students the decrease in perceived scholastic abilities was larger than for older students. It is important to note that these students were in their first year of high school, suggesting that the initial exposure to a more competitive outcome-oriented environment has a strong initial impact as students

adjust to the new environment. Moreover, since the decline in self-perceived competence occurs only in the academic milieu, we can assume that it is not merely the transition to high school that is influencing this decline. If it were, we would experience equivalent declines across all domains of self-concept. Instead, the evidence points to the change in the academic system as contributing to the decline. Given the societal demand for greater knowledge skills throughout larger segments of the population, the historical designs and cultural legacy of high schools likely merits serious reflection (Keating, 1999).

Examining the Hierarchical Nature of Changes in Self-Concept

This study was undertaken, in part, to examine the structure of self-concept as it changes over high school. In examining the hierarchy, we consistently found that appearance was most closely tied to overall self-worth, with the domains of scholastic competence, job competence, close friendships, and social acceptance being less closely, but significantly, tied to overall self-worth. This was found when looking at each wave of the study (encompassing students at all levels of high school – Grades 9 through 12) and when looking at the changes in self-worth across this period. We found that when participants were younger, the next most important domain after appearance was job competence. This pattern most likely reflects the fact that in Grade 9 or 10 participants reached the legal age of employment (which is 15 in Canada) and either had or were looking for their first jobs. For the second phase of the study, when participants were in Grades 11 or 12, the next most important domain (after appearance) was scholastic competence. This likely reflects the fact that grades were becoming increasingly important as participants were nearing the end of high school. The patterns of our findings are compatible with other research in this area (Harter, 1999); however, our findings extend the previous work by looking at it across two years of adolescent development, demonstrating that the relationship of the different domains to overall self-worth is stable (although, save for the domain of appearance, the influence of each domain on general self-worth does appear to fluctuate).

These findings again confirm the need for interventions that reduce the focus on and importance of appearance to overall self-worth. Given that we found the changes in self-worth to be predicted by the current levels and the changes in these domains (as opposed to earlier levels), interventions can be implemented at any age. That is, our findings show that there is a direct route to general self-worth via current levels of specific domains and that any induced fluctuations in these domains will be directly reflected in gains to overall self-worth. Thus, we can be optimistic that intervening at any time developmentally will benefit overall self-concept.

It is important to note that the data for this study are from a Canadian sample. This means that the structure and change in self-concept is robust across several countries, including the United States (e.g., Harter, 1999), Australia (e.g., Marsh, 1989), and now Canada. This implies that socialization experiences are very similar across these countries; as well, it suggests that there are developmentally similar patterns in the development of self systems over the course of adolescence, which would seem to implicate both cognitive and socio-emotional systems.

Examining Weighted Domains of Self-Concept as Predictors of General Self-Worth

The final set of analysis we conducted examined whether weighting each domain of self-worth by the importance an individual places on it better predicts general self-worth. Regardless of whether we used change in self-rated importance, Time 1 ratings, or Time 2 ratings as the weighting variable, adding the weighted measures to the regression did not improve the model. Although there have previously been mixed results in this area, these findings reflect those of Marsh and Hattie (1996), who found little support for the additional explanatory power of weighting each domain by its respective importance rating. Our findings extend their work by demonstrating that the importance weightings do not predict the changes occurring in self-worth. However, it should be noted that it may be the case that, due to the homogeneity of this sample, there was less variability in the domains of importance and that given the similarity of their socialization experiences, there was consistency in the areas of self-concept that were of value.

Although this study incorporated longitudinal data, we looked at only two time points, and both of these time points were within high school. Future studies need to examine changes across multiple time points to elucidate potential nonlinearity in self-concept trajectories. In addition, it is important that self-concept be examined across educational and developmental transitions, for example, from pre-high school to high school, as well as from high school to post-secondary. Doing so will enable us to identify contextual influences and provide information about potential times of flux and stability in the development of self-concept.

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