Cognitive–motivational antecedents of career decision-making processes in Portuguese high school students: A longitudinal study

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Abstract

In this study we propose an integrated framework of the antecedents of identity development and well/ill-being for high school students (N = 462) in the transition to higher education/job market. One study was conducted to investigate the effects of basic psychological need-satisfaction/frustration (as proposed within self-determination theory) and career decision-making self-efficacy (posited by social cognitive career theory) on the identity dimensions and experienced well/ill-being. Three longitudinal nested models were tested: a need-satisfaction/self-efficacy main effects model, an identity main effects model and a reciprocal main-effects model. The reciprocal effects between the variables were favored by the data. Basic need-satisfaction and career decision making self-efficacy positively predicted proactive exploration and commitment-making, while basic need-frustration predicted both diminished well-being and ill-being. Reciprocally, proactive exploration investments positively predicted whereas ruminative exploration negatively predicted, need-satisfaction and career decision-making self-efficacy. Implications for the design of career interventions are discussed and suggestions for future research proposed.

Keywords:
Basic psychological needs
Career decision-making self-efficacy
Identity
Self-determination theory
Social learning career theory

1. Introduction

The formation of an integrated sense of personal identity is a primary developmental task in adolescence. For Erikson, a well-developed identity allows the individuals to be more conscious of their strengths and weaknesses that are associated to experiences of psychological well-being, whereas an underdeveloped identity structure leaves adolescents more confused and vulnerable for ill-being (Erikson, 1968; Soenens, Berzonsky, Dunkel, Papini, & Vansteenkiste, 2011).

Identity development is key to understand the transitions that take place from adolescence to early adulthood, where, youth is challenged to develop their identities in a variety of life domains, including career, ideology, and romantic engagement (Arnett, 2000; Erikson, 1968). Much of the Neo-Eriksonian theorization on identity was based on the Identity Status Model (Marcia, 1980) and essentially focused on exploration and commitment processes of identity development (e.g., Luyckx, Goossens, & Soenens, 2006; Luyckx, Goossens, Soenens & Beyers, 2006). Exploration was described as the degree of exploration of various social roles and self-appraisal about personal goals, values, and beliefs and commitment relates to having a stable set of life values, goals and convictions (Marcia, 1980). In one of the recent extensions of the identity status model, Luyckx and colleagues (Luyckx, Goossens, & Soenens, 2006; Luyckx, Goossens, Soenens, et al., 2006) proposed a more dynamic view of identity formation by unpacking the dimensions of exploration and commitment. A model of identity development with five core dimensions is proposed. Identity exploration
encompasses the dimensions of exploration in breadth, i.e., the degree to which adolescents search for different alternatives with respect to goals, beliefs, and values before making commitments, exploration in depth, featuring the in-depth evaluation of commitments, choices, and plans already made and their convergence with internal standards, and ruminative exploration, featuring indecisiveness, hesitation, worry, and flawed decision-making (Luyckx et al., 2008). Identity commitment encompasses the dimensions of commitment-making, tapping into the degree to which the individuals make firm identity choices, and identification with commitment describing the degree to which adolescents feel certain about and can identify with their identity commitments.

As conceptualized, the five-component model has the advantage of capturing both the adaptive and maladaptive aspects of identity formation (Luyckx, Vansteenkiste, Goossens, & Duriez, 2009). Furthermore, it is also under discussion how global identity dimensions relate and distinguish from more domain-specific identity processes, such as vocational or career identity. Career identity is defined as central the sense of self derived from one’s development of an occupational career, being an important component of one’s overall identity (Stringer, Kerpelman, & Skorikov, 2012). Exploring and committing to a particular career pathway is one of the most important tasks for late adolescents that face the career transition from high school to higher education or to the job market (Stringer et al., 2012) and a successful resolution of these identity dimensions has an impact on immediate and future career opportunities (Luyckx, Duriez, Klimstra, & de Witte, 2010). However, the characterization of career-related identity processes was not, until recently, accompanied by an examination of their antecedents and correlates (e.g., Sartor & Youniss, 2002).

We believe that self-determination theory (Deci & Ryan, 1985, 2000) is capable of shedding further light on the integrated versus derailed process of identity development. In SDT, the self is an innate growth-oriented process that guides individuals towards psychological development, integrity and identity synthesis. This integrative process is energized by the satisfaction of three innate and universal psychological needs (BPNT; Deci & Ryan, 2000; Ryan, 1995): autonomy, competence and relatedness. Autonomy refers to the experience a sense of volition and self-determination in one’s actions, competence, describes feeling of effectiveness and self-efficacy related to the achievement of desired outcomes, and relatedness refers to feelings of being genuinely connected, appreciated and accepted by others within warm and intimate interpersonal relations. For SDT needs are innate universal energizing forces that drive the self towards greater identity development and synthesis, and constitute the necessary vitamins for one’s well-being and health (Deci & Ryan, 1985; Deci & Ryan, 2000). Research using SDT as a conceptual framework found that the satisfaction of the autonomy, competence and relatedness needs positively predicted proactive identity exploration, commitment-making and experiences of well-being and negatively predicted ruminative exploration (Deci & Ryan, 2000; Luyckx et al., 2009). Yet, the role of need frustration to predict trajectory identity development and adjustment in the transition to higher education or to the job marked has not been examined.

From a different angle, Social-Cognitive Career Theory (SCCT; Lent & Brown, 2006; Lent, Brown, & Hackett, 1994) suggested that identity development is not only associated to the broad, complex judgements that individuals make about their subjective experiences of basic need-satisfaction, but it is also determined from identity development is not only associated to the broad, complex judgements that individuals make about their subjective experiences of basic need-satisfaction, but it is also determined from identity development is not only associated to the broad, complex judgements that individuals make about their subjective experiences of basic need-satisfaction, but it is also determined from identity development is not only associated to the broad, complex judgements that individuals make about their subjective experiences of basic need-satisfaction, but it is also determined from

2. Present research and hypotheses

Building on SDT and SCCT research, the primary aim of this study was to test an integrated model of the antecedents of identity development and experiences of well/ill-being for students involved in the transition to higher education/job market. More specifically, we examine how broad appraisals of psychological needs (need satisfaction; need frustration) and career-specific self-efficacy beliefs (CDSE) predict changes in key dimensions of identity development (exploration in breadth, exploration in depth, ruminative exploration and commitment-making) and psychosocial adjustment (well-being, ill-being) over time. Five hypotheses were formulated for this study.

**Hypothesis 1.** Symmetrical effects of psychological needs and CDSE.

Experiences of need satisfaction and CDSE at T1 positively predict exploration in breadth, exploration in depth and well-being at T2 (Hypothesis 1a) whereas need frustration at T1 positively predicts ruminative exploration and ill-being at T2 (Hypothesis 1b; Lent et al., 1994; Luyckx et al., 2009; Ryan & Deci, 2000).

**Hypothesis 2.** Crossover effects of psychological needs and CDSE.

Feelings of basic need satisfaction and CDSE at T1 negatively predict ruminative exploration and ill-being at T2 (Hypothesis 2a) whereas perceptions of need frustration at T1 negatively predict exploration in breadth, exploration in depth, commitment-making and well-being at T2 (Hypothesis 2b). The crossover effects are expected to be lower-sized than the symmetrical effects (Vansteenkiste & Ryan, 2013).

**Hypothesis 3.** Symmetrical effects of identity and well-being.
Exploration in breadth, exploration in depth, commitment-making and well-being at T1 positively predict CDSE and need satisfaction at T2 (Hypothesis 3a) whereas ruminative exploration, and ill-being at T1 positively predict feelings of need frustration at T2 (Hypothesis 3b).

Hypothesis 4. Crossover effects of identity and well-being

Exploration in breadth, exploration in depth commitment-making and well-being at T1 negatively predict the inner feelings of need frustration at T2 (Hypothesis 4a), whereas ruminative exploration at T1 negatively predict need satisfaction and CDSE at T2 (Hypothesis 4b).

Hypothesis 5. Reciprocal effects.

The relations between basic need-satisfaction, CDMS, identity, and well/ill-being are reciprocal over time (Luyckx et al., 2009; Ryan & Deci, 2003).

3. Method

3.1. Participants and procedure

Data was collected in two waves of measurement. The first wave took place at the beginning of the first term (Time 1: October, 2013). A sample of 755 12th grade students, selected from Portuguese secondary schools (455 girls [60.3%], mean age of 17, 36 years [SD = 0.89]), completed the questionnaires. The second wave of measurement took place nine months later (Time 2: July, 2014) after the exams required to enter higher education were completed and their choice concerning their future career path is made. A subsample of Sample 1, consisting of 462 Portuguese students (278 girls [60.2%] and 184 boys [39.8%], aged between 16 and 22 years, with a mean age of 17.12 years (SD = 0.92), completed the questionnaires. The choice for 12th grade students was relevant because in the Portuguese Educational System it is mandatory for students who want to enter university to perform specific exams to access the preferred major. Therefore, we expect strong career-related exploration efforts and commitment-making throughout the 12th grade career transition, with important reflections on the quality of adjustment experienced. Questionnaires were administered during regular class hours, after approval from the ethical committee of Coimbra University and once informed consent was obtained from students or from parents of underage students. Participation was voluntary, anonymity guaranteed and no credits were granted for participation in the study. In both measurement waves, students took no longer than 30 min to complete the questionnaires.

3.2. Measures

3.2.1. Need satisfaction and need frustration

We used the Portuguese version of the Balanced Measure of Psychological Needs scale (BMPN; Sheldon & Hilpert, 2012; Portuguese version Cordeiro, Paixão, Lens, & Sheldon, under review). Composite scores of basic need-satisfaction and need-frustration were calculated by averaging the scores of the three 3-item subscales measuring autonomy, competence and relatedness satisfaction (e.g., “I am taking on mastering hard challenges”) and need-frustration, respectively (e.g., “I do things against my will”). Items are rated in a 5-point Likert scale, ranging from 1 = no agreement to 5 = much agreement. In the current sample the internal consistency ranged between .80 and .78 for need-satisfaction and need-frustration, respectively for Times 1 and 2. At Time 1, the CFA on the two-factor solution yielded a good fit to the data ($\chi^2$ (291) = 513.81; $p < .001$; $CFI = .94$; $RMSEA = .04$ $p [\text{rmsea} \leq .05] < .001$; $SRMR = .09$).

3.2.2. Career decision-making self-efficacy

We used the 25-item short form of the Career Decision Self-efficacy scale (CDSE; Betz, Klein, & Taylor, 1996; Portuguese version Silva, Paixão, & Albuquerque, 2009) to measure an individual’s degree of belief that he/she can successfully perform and complete the tasks required to make career decisions (e.g., “Find information about professional activities that interest you”). The CDSE assesses five career choice competences, that are (1) accurate self-appraisal, (2) gathering occupational information, (3) goal selection, (4) making plans for the future and (5) problem-solving. Items are rated in a 5-point Likert-type format, ranging from 1 = no confidence at all to 5 = complete confidence. In the current study, CFA on the unidimensional model showed a good fit to the data (Time 1; ($\chi^2$ (291) = 50.53; $p < .001$; $CFI = .98$; $RMSEA = .06$ $p [\text{rmsea} \leq .05] < .001$; $RMR = .04$).

3.2.3. Identity development

We translated the 25-item Dimensions of Identity Development Scale (DIDS; Luyckx et al., 2008), following the recommendations for translating a scale into a different language (Hambleton, 2001). The DIDS dimensions of commitment making (“I have decided on the direction I am going to follow in my life”; Time 1 $\alpha = .89$; Time 2 $\alpha = .87$), exploration in breadth (“I think about different things I might do in the future”; Time 1 $\alpha = .86$; Time 2 $\alpha = .88$), exploration in depth (“I talk with other people about my plans for the future”; Time 1 $\alpha = .62$; Time 2 $\alpha = .66$) and ruminative exploration (“I am doubtful about what I really want to achieve in life”; Time 1 $\alpha = .82$; Time 2 $\alpha = .72$) were used in this study. For model parsimony the dimension of identification with commitment
was excluded from analyses. Dimensions are rated on a 5-point Likert scale ranging from 1 completely disagree to 5 completely agree. At Time 1, CFA for the four-factor solution yielded a good fit to the data ($\chi^2 (29) = 141.11; p < .001; \text{CFI} = .96; \text{RMSEA} = .07$ p $\text{RMSEA} \leq .05 < .001; \text{SRMR} = .04$).

3.2.4. Well-being

The 5-item Satisfaction With Life Scale — SWLS (Diener, Emmons, Larsen, & Griffin, 1985; e.g., “I am satisfied with my life”; Portuguese version, Simões, 1992) was used to assess the hedonic dimension of subjective well-being. The scale $\alpha$ reported was of .87 (Diener et al., 1985) in the original study and of .84 in the Portuguese version. Additionally we used the Subjective Vitality Scale (Ryan & Frederick, 1997, $\alpha = .84$; Portuguese version, Lemos, Gonçalves, & Coelho, 2011; $\alpha = .86$) to measure the eudaimonic component of well-being (Ryan & Deci, 2001). The SV is a 5-item measure developed to evaluate how alive and alert people have been feeling during the last month (e.g., “I feel alive and vital”). Both SWLS and SV scales were rated in a Likert-type 5-point scale, ranging from 1 (“Completely untrue/Not at all true”) to 5 (“Completely true/Very true”). In the current study we combined both scales into a composite score of well-being. CFA on the unidimensional model yielded a good fit at Time 1 $\chi^2 (12) = 95.27 p < .001; \text{CFI} = .98; \text{RMSEA} = .04$ p $\text{RMSEA} \leq .05 < .001; \text{SRMR} = .04$. Items loaded above .60 and scales showed good internal consistency (Time 1 $\alpha = .86$; Time 2 $\alpha = .90$).

3.2.5. Ill-being

Ill-being was measured by the Portuguese version of the 18-item Brief Symptom Inventory (Derogatis, 2001; Portuguese version, Canavarro, 2007). The BSI-18 is a self-report symptom inventory designed to assess the psychological symptoms of anxiety (e.g., “Feeling tense or keyed up”), depression (e.g., “Feeling lonely”) and somatization (e.g., “Pains in heart or chest”), and a General Severity Index. The items were rated on a 4-point Likert scale of distress, ranging from 0 (“Not at all”) to 4 (“Extremely”). The scales showed good internal consistency, ranging between .79 and .85 in the Portuguese version. In the current sample we used General Severity Index (GSI), based on the high correlations observed between the three variables ($r = .64$ to $r = .96$; Canavarro, 2007). GSI was modeled as a 2nd order factor indicated by the first-order factors of anxiety, depression and somatization that, in turn, used items as indicators. CFA on the unidimensional model yielded a good fit to the data at Time 1 $\chi^2 (130) = 526.45 p < .001; \text{CFI} = .93; \text{RMSEA} = .06$ p $\text{RMSEA} \leq .05 < .001; \text{SRMR} = .04$. Scales evidenced good internal consistency (Time 1 $\alpha = .87$; Time 2 $\alpha = .89$) and indicator loadings ranged between .50 and .85 at both Time moments ($p < .001$).

4. Results

4.1. Preliminary results

4.1.1. Sociodemographic factors

A multivariate analysis of variance (MANOVA) was performed to determine the impact of the socio-demographic factors on the study variables. Gender was entered as an independent variable and the study variables as dependent variables. A multivariate effect of gender on the outcomes was found (Wilks’s $\Lambda = .87$, $F (17, 444) = 3.97, p < .001, \eta^2 = .13$. Follow-up univariate analysis of variance indicated, in line with previous research that girls (Time 1, $M = 1.90, SD = .69$; Time 2, $M = 1.88, SD = .68$) scored higher than boys (Time 1, $M = 1.64, SD = .55$; Time 2, $M = 1.58, SD = .50$) on ill-being. No other significant gender differences (all $p > .05$) emerged. Based on the gender differences found we statistically controlled gender in the primary analysis.

4.1.2. Correlations

In a subsequent procedure we computed zero-order correlations among the study variables. Table 1 presents the within-time associations among the study variables at both waves of measurement. The correlations at Times 1 and 2 were highly similar. As expected, significant positive correlations ($p < .05$) were found between (a) need-satisfaction, CDMSE, exploration in breadth, commitment-making, and well-being, and between (b) need-frustration, ruminative exploration and ill-being. Exploration in

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th></th>
<th></th>
<th>Time 2</th>
<th></th>
<th></th>
<th>F</th>
<th>$\eta^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need-satisfaction</td>
<td>4.11</td>
<td>.69</td>
<td>.81</td>
<td>4.79</td>
<td>.54</td>
<td>.85</td>
<td>490.01***</td>
<td>.52</td>
</tr>
<tr>
<td>Need-frustration</td>
<td>2.22</td>
<td>.85</td>
<td>.83</td>
<td>2.00</td>
<td>.71</td>
<td>.80</td>
<td>53.67***</td>
<td>.10</td>
</tr>
<tr>
<td>Exploration in breadth</td>
<td>3.93</td>
<td>.86</td>
<td>.70</td>
<td>3.67</td>
<td>.88</td>
<td>.79</td>
<td>36.73***</td>
<td>.07</td>
</tr>
<tr>
<td>Exploration in depth</td>
<td>3.55</td>
<td>.89</td>
<td>.62</td>
<td>3.27</td>
<td>.89</td>
<td>.66</td>
<td>36.13***</td>
<td>.07</td>
</tr>
<tr>
<td>Ruminative exploration</td>
<td>3.35</td>
<td>1.04</td>
<td>.82</td>
<td>3.17</td>
<td>.93</td>
<td>.77</td>
<td>11.64***</td>
<td>.03</td>
</tr>
<tr>
<td>Commitment-making</td>
<td>2.87</td>
<td>1.30</td>
<td>.87</td>
<td>3.09</td>
<td>.81</td>
<td>.89</td>
<td>11.42**</td>
<td>.02</td>
</tr>
<tr>
<td>Well-being</td>
<td>3.46</td>
<td>.77</td>
<td>.86</td>
<td>3.69</td>
<td>.68</td>
<td>.90</td>
<td>48.55***</td>
<td>.11</td>
</tr>
<tr>
<td>Ill-being</td>
<td>1.80</td>
<td>.66</td>
<td>.87</td>
<td>1.76</td>
<td>.63</td>
<td>.89</td>
<td>4.44</td>
<td>.03</td>
</tr>
</tbody>
</table>

F-values represent differences between mean scores for Time 1 and Time 2.

*** $p < .001$. 
** $p < .01$. 
* $p < .05$. 

Table 1
Mean-level changes, standard deviations, and F-values of the study variables.
depth and commitment-making was not significantly associated with basic needs and CDMSE. Conversely, need-satisfaction, CDMSE, exploration in breadth, commitment-making and well-being were negatively related to need-frustration, ruminative exploration and ill-being whereas need frustration is negatively related to need-satisfaction, CDMSE, exploration in breadth, commitment-making, and well-being.

4.1.3. Attrition
Two hundred and ninety three students (38%) of the initial group did not complete the questionnaires at T2. High attrition rate was justified and was explained by the fact that students were randomly absent from classes or from school due to scheduled curricular activities that include sports competitions and apprenticeship activities in work settings. Those students did not differ in gender, age or on any psychological measure assessed at T1 from the remaining group. Missing data analysis showed that individual missing values were randomly observed at both waves of measurement. Mean replacement was used to deal with missing data.

4.2. Primary results

4.2.1. Mean-level changes
To assess mean-level changes between the assessed constructs, a multivariate repeated-measures of variance (RANOVA) was conducted. Results are summarized in Table 2. The findings show that need satisfaction and commitment-making significantly increased from the first to the second waves of measurement whereas need-frustration, exploration in breadth, exploration in depth and ruminative exploration decreased over time.

4.2.2. Hierarchical multiple regression analyses
A two-step hierarchical regression analysis was computed to test the hypothesis that CDMSE significantly predicted identity development and adjustment over and above the effect of psychological need satisfaction and need frustration. Regression analysis was performed separately for each of the six motivational outcomes, with gender entered as a control variable. In step 1 gender, psychological need satisfaction and need frustration were entered as predictors. In step 2, CDMSE was added to the prediction. Results are summarized in Table 3. In step 1, the findings show that need satisfaction at T1 had a strong predictive effect on exploration in breadth and well-being (p < .001) and less pronounced positive effects on exploration in depth and commitment-making at T2 (p < .05). In step 2, CDMSE was added to the regression equation. CDMSE significantly added to the prediction of exploration in breadth and well-being at T2 and, inclusively become the unique significant predictor of commitment-making, exploration in depth and ruminative exploration. However need satisfaction remained the strongest predictor of well-being and the unique predictor of ill-being at T2. In sum, findings show that CDMSE has significant predictive effects on identity and adjustment above and beyond need satisfaction, and it should be used in further analyses.

4.2.3. Longitudinal cross-lagged associations
To examine the study hypotheses we estimated longitudinal path models with manifest variables in AMOS 20.0, controlling for all within-time associations and stability coefficients (see Luyckx et al., 2009 for a similar procedure). Variables were indicated by scale scores calculated on each construct. Goodness-of-fit was judged from multiple fit indices: the Chi square (χ²) statistics, the Standardized Root Mean Square Residual (RMR), the Comparative Fit Index (CFI) and the Root Mean Squared Error of Approximation (RMSEA). The cut-off values of .09 for SRMR, .06 for RMSEA, p [rmsea ≤ .05] and .90, or above, for CFI indicated good model fit (Hu & Bentler, 1999). Data screening of the observed variables showed partial non-normality at the multivariate level (multivariate kurtosis). To correct for non-normality solutions were generated with Maximum Likelihood Estimation with 1000 bootstrap samples with replacement based on the original sample. Gender was modeled as a single indicator with error variance fixed to 0.

Hypotheses 1 and 2 were tested in Model 1 (need-satisfaction/CDMSE main-effects model). Model 1 specified paths from basic need-satisfaction, need-frustration and CDMSE (T1) to exploration in breadth, exploration in depth, commitment-making, ruminative

### Table 2
Correlations of the study variables.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.</td>
</tr>
<tr>
<td>1. Need-satisfaction</td>
<td>1</td>
</tr>
<tr>
<td>2. Need-frustration</td>
<td>−.61**</td>
</tr>
<tr>
<td>3. Self-efficacy</td>
<td>.45**</td>
</tr>
<tr>
<td>4. Exploration in depth</td>
<td>.11</td>
</tr>
<tr>
<td>5. Exploration in breadth</td>
<td>.46**</td>
</tr>
<tr>
<td>6. Ruminative exploration</td>
<td>−.22</td>
</tr>
<tr>
<td>7. Commitment-making</td>
<td>.23</td>
</tr>
<tr>
<td>8. Well-being</td>
<td>.53**</td>
</tr>
<tr>
<td>9. Ill-being</td>
<td>− .28**</td>
</tr>
</tbody>
</table>

SD = Values at the lower and upper diagonals refer to the correlation matrix at Times 1 and 2, respectively.

* p = .05.
** p < .01.
*** p < .001.
Table 3
Hierarchical regression analyses regressing identity and adjustment on psychological needs and CDSME.

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Exploration in breadth</th>
<th>Exploration in depth</th>
<th>Commitment-making</th>
<th>Ruminative exploration</th>
<th>Well-being</th>
<th>Ill-being</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Need satisfaction</td>
<td>.41***</td>
<td>.21***</td>
<td></td>
<td>.12*</td>
<td>.04</td>
<td>.11*</td>
</tr>
<tr>
<td>CDMSE</td>
<td>.45***</td>
<td>.17***</td>
<td></td>
<td>.33***</td>
<td>.12*</td>
<td>.11*</td>
</tr>
<tr>
<td>R²</td>
<td>.17***</td>
<td>.33***</td>
<td></td>
<td>.02***</td>
<td>.08***</td>
<td>.02*</td>
</tr>
<tr>
<td>R² change</td>
<td>.16</td>
<td>.02**</td>
<td></td>
<td>.08***</td>
<td>.02*</td>
<td>.07***</td>
</tr>
</tbody>
</table>

Note. * p < 0.05. ** p < 0.01. *** p < 0.001.

exploration, well-being, and ill-being (T2) controlling for self-regressive effects of identity dimensions and adjustment at T1. Estimation of trimmed Model 1 yielded a good fit to the data (χ²(39) = 68.54; p < .001; CFI = .988; RMSEA = .04 [95% CI: 0.03 - 0.05]; RMR = .01). Findings show that CDMSE (T1) uniquely predicted commitment-making (β = .19, p < .001) and positively predicted well-being (β = .27, p < .001), exploration in breadth (β = .27, p < .001), and, to a less extent, exploration in depth (β = .07, p < .05) at T2. Additionally, need frustration positively predicted ruminative exploration (β = .10, p < .05) and uniquely predicted ill-being (β = .20, p < .001) and low well-being (β = .10, p < .01) at T2. Finally, need satisfaction positively predicted well-being (β = .19, p < .01). Altogether, the predictors explained 25% of exploration in breadth, 14% of commitment-making, 15% of ruminative exploration and 5% of exploration in depth at T2. In terms of adjustment, the predictors explained 37% of well-being and 53% of ill-being.

Hypotheses 3 and 4 were tested in Model 2 (identity main-effects model). Model 2 specified paths from identity (exploration in breadth, exploration in depth, ruminative exploration and commitment-making) and adjustment (well-being and ill-being) at T1 to need satisfaction, need frustration and CDSME, (T2), controlling for the self-regressive effects of identity dimensions and adjustment at T1. Estimation of the trimmed Model 2 yielded a good fit to the data (χ²(17) = 35.14; p < .001; CFI = .992; RMSEA = .03 [95% CI: 0.02 - 0.04]; RMR = .02). Findings show that exploration in breadth at T1 positively predicted need satisfaction at T2 (β = .20, p < .001), exploration in depth at T1 positively predicted CDMSE at T2 (β = .08, p < .05) and well-being at T1 positively predicted need satisfaction at T2 (β = .19, p < .001). In addition, exploration in breadth at T1 negatively predicted need frustration at T2 (β = -.13, p < .01), ruminative exploration and exploration in depth at T1 negatively predicted CDMSE at T2 (β = -.11, p < .001; β = -.07, p < .01) and well-being at T1 negatively predicted need frustration at T2 (β = -.10, p < .05). Commitment-making and ill-being at T1 were not significant predictors of any of the outcomes at T2. Altogether, the predictors explained 55% of CDMSE, 34% of need satisfaction and 46% of need frustration.

Table 4
Estimates of path analysis for Model 3.

<table>
<thead>
<tr>
<th>Time 1</th>
<th>Time 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Needs Satisfaction</td>
<td>.29***</td>
</tr>
<tr>
<td>Needs Frustration</td>
<td>-.03</td>
</tr>
<tr>
<td>CDMSE</td>
<td>.15**</td>
</tr>
<tr>
<td>Well-being</td>
<td>.12*</td>
</tr>
<tr>
<td>Ill-being</td>
<td>-.09*</td>
</tr>
<tr>
<td>Exploration in breadth</td>
<td>.17***</td>
</tr>
<tr>
<td>Exploration in depth</td>
<td>.03</td>
</tr>
<tr>
<td>Ruminative exploration</td>
<td>.00</td>
</tr>
<tr>
<td>Commitment-making</td>
<td>.03</td>
</tr>
</tbody>
</table>

Path estimates correspond to standardized regression coefficients (β/etas). Values in gray correspond to within-time stability coefficients.

Note. *p < 0.05; **p < 0.01; ***p < 0.001.
Finally, Hypothesis 5 was tested in Model 3 (reciprocal main-effects model). Standardized parameter estimates of Model 3 are summarized in Table 4. Model 3 includes the paths specified in Model 1 and Model 2, and also additional paths from identity dimensions at T1 to adjustment at T2 and paths relating the four identity dimensions assessed at T1 and at T2.

The trimmed Model 3 yielded a good fit to the data across all the fit indices considered: $\chi^2 (58) = 86.42; p < .01; CFI = .996; RMSEA = .03 p [\text{rmsea }\leq 0.05] < .001; RMR = .01$. The paths flagged as significant in Models 1 and 2 continued significant in Model 3. In addition it was observed that ruminative exploration at T1 positively predicted exploration in depth and negatively predicted well-being at T2 (see Table 3). Model 3 improved the variance explained of exploration in depth in 2% (now 7%) and of well-being in 1% (now 38%), while the remaining variables stayed constant. Model 3 did not significantly differ from Model 1 $\Delta \chi^2 (19, N = 462) = .05, p > .05$ nor from Model 2 $(41, N = 462) = .004, p > .05$.

5. Discussion

In this longitudinal study we tested an integrated model of identity development for Portuguese 12th grade students who are facing the critical career transition to higher education/job market. Based on both SDT and SCCT perspectives, we examined the longitudinal reciprocal effects existing between basic psychological needs, CDMSE, identity development (Luyckx et al., 2009) and adjustment (Cordeiro et al., 2015).

The results on the mean-level changes show that, from T1 to T2, students reported higher need-satisfaction and CDMSE, stronger commitments to specific career paths and higher experienced well-being. In opposition, from T1 to T2 students reported lower need-frustration and less proactive and ruminative identity exploration efforts. Ill-being did not significantly change over time. Collectively, the findings show that, in general, the students’ career transition developed in a positive and adaptive way over time.

In subsequent analyses we examined the directionality of effects linking our study variables. Hierarchical regression analyses showed that CDMSE measured at T1 had an incremental explanatory value on identity and adjustment at T2, over and above the effects of need satisfaction. In addition, CDMSE heavily reduced the magnitude of the effects of need frustration on the identity dimensions and well-being at T2, suggesting possible mediation effects. Based on these findings one could hypothesize that psychological need satisfaction energizes identity development and experiences of well-being during important career transitions to the extent as feelings of need satisfaction raise career-related feelings of self-efficacy for career commitment-making. The exam of this longitudinal mediation hypothesis would be of extended value to clarify the processes linking global and vocational identity development. Nevertheless need satisfaction remains a robust predictor of both high well-being and low Ill-being in the regression equation, suggesting that CDMSE is fundamentally linked to the cognitive and behavioral aspects of identity development, whereas need satisfaction is a more powerful determinant of adjustment over time.

In the second part of our study we provided a comprehensive exam of the relations between need satisfaction, need frustration, CDMSE, identity dimensions and adjustment. Overall, the findings provided support for the five hypotheses outlined.

Results on the need-satisfaction/CDMSE main-effects model reiterate the notion that inner feelings of need satisfaction primarily predict positive adjustment trajectories, CDMSE most significantly predicts positive identity development pathways and need frustration predicts negative outcomes in both identity development and maladjustment (support for H1a). In line with previous research (Germeij & Verschueren, 2007; Lent et al., 2010), these findings underscore the importance of including psychological needs and CDMSE as key predictors of integrated versus derailed processes of identity development and adjustment during important career transitions (e.g., Ezeofor & Lent, 2014; Lent, 2004). In Model 1 it was also observed that need frustration undermined well-being over time whereas need satisfaction CDMSE did not significantly impact ill-being. These findings provide partial support for H1b, while they suggest that need satisfaction and need frustration have independent effects on adjustment (e.g., Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013).

The results obtained for the identity main-effects model support the Hypothesis 3a, b. Findings show that high proactive exploration investments and experienced well-being increase feelings of need satisfaction and CDMSE over time, and protect against feelings of need frustration, whereas ruminative exploration undermines the perceptions of self-efficacy to make strong identity commitments. Overall, the findings stress the importance of assessing the quality of identity-related investments and adjustment prior to career transitions as means to make more accurate predictions about how confidence in career decision-making and perceptions of need satisfaction will evolve across time.

Finally, the results obtained in Model 3 (reciprocal-effects model) show the over-time persistence of significant paths imported from Models 1 and 2. In addition, it was observed that decreased intentionality and decidedness in the exploration of career alternatives predict in-depth reflections about the career options to follow and undermine the confidence in career commitment-making and well-being, but does not necessarily predict higher ill-being across time. Altogether, the findings suggest that identity development and adjustment are part of a transactional system mutually reinforcing one another during critical career transitions (Luyckx et al., 2009; Ryan & Deci, 2003). However, Model 3 did not fit the data significantly better than Models 1 and 2. Therefore support for Hypothesis 5 is still prospective.

The implications of the findings are noteworthy. Overall, they point out the need to design identity interventions that support the adolescents’ inner experiences of basic need satisfaction and self-efficacy for career decision-making. Specifically, we suggest that parents, teachers and counselors should be instructed for the importance of need-supportive behaviors that (a) convey empathy (or acknowledge) for the adolescents’ perspectives in identity-related issues, (b) encourage self-expression and autonomous exploration of vocational information, d) communicate informational (i.e., competence-relevant) feedback, expressing confidence in the adolescents’ identity-related skills, and e) that convey warm, affective and responsive interactions with children. In parallel, educators should be trained to identify and refrain from using controlling techniques, including (a) setting highly demanding, rigid standards...
(or goals) for identity-related efforts, b) instilling shame, guilt and anxiety for non-compliance with standards/expectations, c) conveying rejection, criticism and love withdrawal until other-related career expectations are met, c) invalidating the adolescents’ perspective in career-related discussions, and d) communicating failure-inducing feedback on career-related investments. By reducing the inner conflict between complying with external requests and pursuing personally endorsed goals, such interventions should be able to reduce ruminative exploration and ill-being across key career transitions.

5.1. Limitations and future research

Our study presents several limitations. First, we relied uniquely on adolescent’s self-reported measures, what may artificially inflate the relations between the constructs due to shared method variance (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Future research should examine the convergence of adolescent and parent’s reports to enhance the validity of the conclusions. Second, the generalizability of the findings may be biased by the specificities of the community-based sample targeted. Findings should be replicated with at-risk or clinically referred adolescents. Third, despite the broad support for the hypothesis under study, alternative explanations might be formulated to interpret the findings. For instance, the modest variance explained for commitment-making and ruminative exploration apply for the inclusion of other antecedent variables in the model, namely those related to family contexts (e.g., Whiston & Keller, 2004). A final limitation is related to having used general measures of identity development (DIDS; Luyck et al., 2009) together with more specific measures of vocational identity (CDMSE; Betz et al., 1996), when other more specific measures of vocational identity are available (Vocational Identity Status Assessment; VISA; Porfeli, Lee, Vondracek, & Weigold, 2011). However, in Portugal clearly the career transitions that students face from the 9th to the 12th grade are founded on global identity issues (Ramos, Paixão, Silva, 2007), thereby it would be very restrictive to use a specific vocational identity measure that is not related to the global identity functioning and construction in late adolescence. From a conceptual perspective, SDT (Deci & Ryan, 2000) tested the relations between psychological needs and global identity functioning, while for SCCT the impact of sociocognitive variables should not be only viewed related to the career identity but to global identity in which this transition moment is inscribed.

6. Conclusion

In this study we used a longitudinal study design to validate a comprehensive model of cognitive–motivational processes implied in identity development and adjustment during the critical career transition to higher education/job market. Hypotheses were derived from SDT, SCCT and identity theorizing and tested in three nested path models. Overall, the findings suggest that the dynamics of identity development and adjustment determine and are determined by cognitive–motivational processes related to basic need satisfaction and CDMSE, thereby suggesting their reciprocal nature.

References


