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EMPIRICAL RESEARCH

Identity Processes and Coping Strategies in College Students: Short-Term Longitudinal Dynamics and the Role of Personality

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Abstract Coping strategies and identity processes are hypothesized to influence one another over time. This three-wave longitudinal study ($N = 458$; 84.9% women) examined, for the first time, how and to what extent identity processes (i.e., commitment making, identification with commitment, exploration in breadth, exploration in depth, and ruminative exploration) and coping strategies (i.e., problem solving, social support seeking, and avoidance) predicted one another over time. Cross-lagged analyses indicated that processes of identity exploration seemed especially to be intertwined with different coping strategies over time, suggesting that identity exploration may resemble problem-solving behavior on the pathway to an achieved identity. Commitment processes were found to be influenced by certain coping strategies, although identification with commitment also negatively influenced avoidance coping. These temporal sequences remained significant when controlling for baseline levels of Big Five personality traits. Hence, evidence was obtained for reciprocal pathways indicating that coping strategies and identity processes reinforce one another over time in college students.

Keywords Identity · Commitment · Exploration · Coping · Longitudinal · Big Five · Personality

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Introduction

Identity formation represents a core developmental challenge that adolescents must address on their way to adulthood (Kroger and Marcia 2011). Erikson (1968) viewed identity formation as a tension between synthesis and confusion, where each individual is charged with finding a balance that favors synthesis over confusion. The stronger one's sense of identity synthesis, the more aware she or he appears to be of her/his uniqueness, strengths, and weaknesses. At the same time, identity confusion is associated with a disorganized or haphazard sense of self (Schwartz et al. 2011). Indeed, previous research has found important effects of identity formation on individual well-being and psychosocial functioning (for overviews, see Kroger and Marcia 2011; Waterman 1999).

Given the importance of identity formation for adolescent functioning, a number of authors have called for an examination of variables that might predispose individuals toward identity synthesis or confusion (Schwartz 2005; Schwartz et al., in press). The coping strategies that individuals use in dealing with daily stressors are hypothesized to function as important determinants of how individuals handle identity-related questions (Seiffge-Krenke et al. 2009). Identity processes, in turn, also are hypothesized to influence the ways in which individuals cope with problems encountered in everyday life (Berzonsky 1992; Luyckx et al. 2008b). However, extant research has not yet tracked the ways in which coping strategies and identity processes might influence one another over time. Accordingly, the goal of the present short-term longitudinal study was to examine potential temporal sequences linking identity processes to coping strategies. In addition, given previously documented associations between personality traits and both identity processes and coping strategies

(Carver and Connor-Smith 2010; Luyckx et al. 2006c), in the present study we also explored the role of personality traits in these temporal sequences. In doing so, we ascertained whether the associations obtained would still be significant when controlling for an important third variable, that is, personality traits.

Processes of Personal Identity Formation

Although Erikson's (1950, 1968) theory of identity was rich and compelling, he often spoke in abstract and clinical terms that increased the difficulty of empirically operationalizing his concepts. Marcia (1966) extracted two defining processes of identity from Erikson's work—exploration and commitment. *Exploration* refers to actively questioning identity alternatives, whereas *commitment* signifies adhering to a set of convictions, goals, and values. Based on these two processes, Marcia (1980) defined four identity statuses: achievement (strong commitments enacted after exploring alternatives), foreclosure (strong commitments enacted without exploration), moratorium (exploring alternatives without current commitments), and diffusion (no current commitments or systematic exploration). Marcia's model has inspired decades of theoretical and empirical work (Kroger and Marcia 2011), much of which has focused on comparing the identity status categories on external variables. A number of identity theorists, however, have emphasized the need to move beyond identity status categories and to rely on process-oriented models of identity (Côté and Levine 1988; Grotevant 1987).

One such model has been introduced by Luyckx et al. (2005, 2006a, b, 2008a), who unpacked both exploration and commitment into four separate but interrelated identity processes. First, whereas Marcia (1966) defined exploration as the degree to which adolescents search for identity alternatives before making commitments, Bosma (1985) and Meeus et al. (2002) argued that identity development also may entail an in-depth exploration and evaluation of existing commitments. Accordingly, subsequent research distinguished between *exploration in breadth* and *exploration in depth* (Luyckx et al. 2006b). Whereas exploration in breadth precedes the formation of (new) commitments, exploration in depth occurs after commitments have been enacted.

Second, Bosma (1985) and Meeus et al. (2002) argued that, apart from the act of making commitments, the degree to which adolescents feel certain about or identify themselves with their choices is also a key issue in identity development. Accordingly, a distinction was made between *commitment making* and *identification with commitment* (Luyckx et al. 2006b). Although commitment making is an important component of identity formation, the enactment of commitments is not an endpoint in itself. The fact that individuals make choices does not automatically imply that they feel confident about these choices or may not wish to change them at some point in the future (Erikson 1968). A sense of identifying with commitments emerges when individuals experience these choices as consistent with their core sense of self (Grotevant 1987; Waterman 2011).

The move from Marcia's (1966) two-process model of identity development to the aforementioned four-process model represents an advance in the identity literature. This latter model, as well as Marcia's model, carries the assumption that exploration is productive and helpful to the person. However, ongoing exploration in breadth has been linked with anxiety, depression, low self-worth, and other forms of distress (Kidwell et al. 1995; Schwartz et al. 2009). A paradox thus emerges: if exploration in breadth is the "best" way to make commitments (especially in Western societies; Bosma and Kunnen 2001), why is it associated with indices of maladaptation?

To address this question, Luyckx et al. (2008a) consulted the psychological and sociological literatures on the transition to adulthood and introduced a fifth identity process. Psychological and sociological literature has stressed that, as contemporary societies have become increasingly individualistic and less supportive, establishing a stable identity has become increasingly challenging for many young people (Arnett 2000; Côté 2002). At the same time, societal pressure on individuals to create their own identity during the transition to adulthood has increased (Baumeister and Muraven 1996). As a result, some individuals become "stuck" in the identity process and experience considerable difficulty enacting firm commitments (Schwartz et al. 2005). Consequently, *ruminative exploration* was added as a fifth process within the Luyckx et al. model. Ruminative exploration is conceptualized as delaying or inhibiting progress in identity development. Individuals scoring high on this process experience difficulty settling on satisfying answers to identity questions (Luyckx et al. 2008a). Troubled by what they perceive as inadequate progress towards personally important identity goals, they keep asking themselves the same questions, resulting in feelings of uncertainty and incompetence (Trapnell and Campbell 1999; Ward et al. 2003).

Identity Processes and Coping Strategies

In an attempt to identify potential antecedents that can explain why individuals rely on functional or dysfunctional identity processes, in the present study we focused on the coping strategies that individuals use in dealing with daily stressors and challenges. Forming a personal identity is commonly viewed as a normative developmental task with which all adolescents and young adults are faced (Arnett 2000). Adolescents and young adults are required to

individualize their life courses and identities by planning for the future, obtaining self-fulfilling educational and employment experiences, and developing personal and intimate relationships. Individuals who address these issues in a proactive and agentic manner and tackle life challenges in a problem-focused manner may be most likely to form a coherent sense of identity that can guide their life paths. In contrast, individuals who adopt more passive or procrastinatory coping strategies also may have trouble forming coherent identities and may not succeed in arriving at firm commitments that can serve as the basis for adult lifestyles (Schwartz et al. 2005). Hence, the manner in which individuals cope with the many daily challenges and stressors they encounter, is hypothesized to influence identity formation (Seiffge-Krenke et al. 2009).

Coping generally is defined as the use of cognitive and behavioral strategies for dealing with pressures, demands, and emotions involved in stressful situations (Lazarus and Folkman 1984). Hence, coping is viewed as a multidimensional construct. A particularly important distinction—which served as the main framework guiding the operationalization of coping in the present study—is the distinction between engagement coping (aimed at active problem solving and dealing with stressors and related emotions) and disengagement coping (aimed at avoiding or withdrawing from problems and escaping feelings of distress; Carver and Connor-Smith 2010). In the present study, core exemplars of these two strategies (i.e., problem solving and avoidance) were assessed, in addition to social support seeking (which is generally viewed as part of engagement coping; Carver and Connor-Smith 2010; Seiffge-Krenke et al. 2009). Although coping strategies are not universally beneficial or detrimental (cf. Wrosch et al. 2003), problem solving and social support seeking have been shown to predict better physical and psychological health, whereas avoidance typically predicts poorer outcomes (Compas et al. 2001; Connor-Smith and Flachsbart 2007).

Coping strategies and identity processes are hypothesized to influence one another in a reciprocal fashion. That is, not only are coping skills thought to facilitate or impair identity processes, but also one's identity has been hypothesized to function as a potential internal resource for invoking certain coping strategies (Berzonsky 1992). For instance, focusing on the role of identity formation in dealing with illness-related stressors in a sample of youth with Type 1 diabetes, Luyckx et al. (2008b) found that achieving a synthesized identity enabled individuals to cope more effectively with the many challenges inherent in the management of diabetes and seemed to protect them against the use of withdrawal or avoidant coping strategies. However, the cross-sectional nature of that study precluded any sound conclusions about the direction of effects in these relationships.

The Explanatory Role of Personality Traits

Given that personality traits have been shown to be meaningfully related to both coping strategies and identity processes, it might be argued that personality traits should be taken into account so that valid conclusions about sequencing in the identity–coping relationship can be drawn. Personality traits may indeed represent common factors that partially explain associations between coping strategies and identity processes. The most commonly used model capturing the higher-order structure of personality is known as the Big Five model, which consists of five overarching personality traits (McCrae and Costa 1987): neuroticism (lacking the capacity to deal effectively with negative emotions), extraversion (a tendency to experience positive moods, and being active and dominant in social interactions), openness to experience (curiosity, intellect, and creativity), agreeableness (a tendency to engage in behaviors that facilitate gaining and maintaining positive and reciprocal relations with others), and conscientiousness (planful, organized, and responsible behavioral tendencies; Caspi et al. 2005; McCrae and John 1992).

Abundant research to date has focused on the associations between these personality traits and various coping strategies. Specifically, extraversion, conscientiousness, and openness to experience have been found to relate positively to problem-solving coping; extraversion and agreeableness generally are related to social support seeking; and neuroticism often is related to less problem solving and more avoidance coping. Finally, conscientiousness and agreeableness tend to relate negatively to avoidance (for overviews, see Carver and Connor-Smith 2010; Connor-Smith and Flachsbart 2007). The Big Five traits also have been related to identity processes (Luyckx et al. 2006c). In a recent study (Klimstra et al. in press), neuroticism was related negatively to identification with commitment and exploration in depth, and positively to ruminative exploration. Except for a negative association with ruminative exploration, extraversion and conscientiousness were related positively to all of the identity processes. Finally, openness to experience and agreeableness were related positively to exploration in breadth and in depth. In sum, in the present study we examined the robustness of the prospective associations between coping strategies and identity processes by including all Big Five personality traits at baseline as potential explanatory variables in the analysis.

The Moderating Role of Personality Traits

Personality traits also may moderate the associations between coping strategies and identity processes. This would imply that coping-identity associations would be more pronounced for those individuals with high or low scores on particular Big Five personality traits. The

differential coping-effectiveness model (Bolger and Zuckerman 1995) holds that personality traits indeed moderate the effectiveness of coping strategies. For instance, problem solving strategies could result in optimal effects for emotionally stable individuals but may tend to backfire for emotionally unstable individuals because such neurotic individuals are less flexible and efficient in implementing these strategies. Although such mechanisms were demonstrated to occur in the relationship between coping and adjustment (Carver and Connor-Smith 2010), they have not been explored in the relationship between coping strategies and identity processes. One might hypothesize that emotionally stable individuals not only would engage in more problem solving coping but also would do so more efficiently—potentially enabling them also to explore more adaptively when faced with identity questions (Carver and Connor-Smith 2010). Hence, in the present study we systematically examined the potential moderating effects of Big Five personality traits on the prospective associations between coping strategies and identity processes.

The Present Study

In line with the theoretical framework outlined above, we hypothesized that coping strategies and identity processes would influence one another reciprocally over time in college students. Such reciprocal influences could shed light on how certain identity processes and coping strategies come about and potentially accumulate over time. We hypothesized that problem solving would be related positively to commitment making, identification with commitment, exploration in breadth, and exploration in depth, but negatively to ruminative exploration. Individuals who use proactive problem-solving strategies, such as considering alternative solutions and trying to alter the situation, are likely to rely on functional exploration strategies when dealing with identity issues and might be more inclined to commit themselves to the best available options (Berzonsky 1992). At the same time, the feelings of competence and agency resulting from engagement coping strategies such as problem solving might stimulate adaptive identity work (Luyckx et al. 2009).

We also hypothesized that disengagement coping strategies would be related negatively to commitment processes and positively to ruminative exploration. A core characteristic of individuals scoring high on ruminative exploration is that they procrastinate in making commitments because they are indecisive and driven by such high standards that they avoid enacting specific commitments (Luyckx et al. 2008c). Hence, we hypothesized that such individuals would score high on avoidant coping strategies.

Finally, we hypothesized that social support seeking would be related positively to the commitment processes because the support of significant others generally would allow one to become more strongly invested in one's chosen identity. Relatedly, a positive association with exploration in breadth and in depth was anticipated because social support is likely to provide people with a sense of psychological security to safely explore one's environment (Luyckx et al. 2009). Similarly, although it is possible that people engage in exploratory activities on their own without seeking support from others, an important way of gathering information about current commitments or potential alternatives is talking with others and relying on social feedback (Grotevant 1987; Kerpelman et al. 1997). Such expectations again point to a possible positive relationship between social support seeking and identity exploration.

Given that coping strategies and identity processes both are related closely to the Big Five personality traits, in the present study we aimed to explore whether the obtained temporal sequences linking coping strategies to identity processes would remain significant when accounting for associations with the Big Five personality traits. Put differently, by controlling for the associations with the Big Five personality traits, we would be able to rule out the alternative explanation that links between coping strategies and identity processes might be due to their common association with personality. Relatedly, in line with the differential coping-effectiveness model (Bolger and Zuckerman 1995) aforementioned, we also explored whether the associations between coping strategies and identity processes were moderated by the Big Five personality traits.

Finally, although not of primary interest to the present study, we examined gender differences in identity processes and coping strategies and examined prospective relationships between coping strategies and identity processes when controlling for such gender differences. Previous research on identity and coping found gender differences in mean levels, with, for example, males scoring lower than females on social support seeking and, although not consistently across studies, males scoring somewhat lower than females on identity exploration (Luyckx et al. 2009; Seiffge-Krenke 2011). Hence, it is important to include gender as a control variable in the primary analyses. Such an analytic strategy allows one to draw valid conclusions on the temporal associations between coping strategies and identity processes irrespective of mean gender differences.

Method

Participants and Procedure

Data for the present study were collected at a large university in the Dutch-speaking part of Belgium that mainly attracts Caucasian students with a middle-class

background. The first wave was collected at the end of 2009. Students participated in three measurement waves, each 3 months apart. Participants were informed about the purpose of the study before the Time 1 assessment. All participants signed a standard consent form before participating at Time 1. During the consent process, participants were informed that they could refuse or discontinue participation at any time. All students were assigned a unique code number to protect their confidentiality. At Time 1, all participants were freshmen from the Faculty of Psychology and Educational Sciences. Given that our assessments (using paper-and-pencil questionnaires) were organized in collective testing sessions for which students received course credit, none of the students whom we initially contacted declined to participate at Time 1.

Our sample was comprised of 458 students, of whom 84.9% were women. A total of 94% of participants were Caucasian. The mean participant age at Time 1 was 18.25 years (SD = 0.97; range 17–24). In the present sample, 8.3% of the data at the scale level were missing over time due to attrition. Participants with and without complete data were compared using Little's (1988) Missing Completely At Random (MCAR) test. A non-significant MCAR test statistic, χ^2 (233) = 5.49, *ns*, suggested that these missing values could be reliably estimated. Accordingly, to handle cases with missing values, we used the full information maximum likelihood (FIML) procedure provided in Mplus 4.0 (Muthén and Muthén 2002), which produces less biased and more reliable results as compared with more conventional methods such as listwise deletion (Enders 2010).

Measures

Coping Strategies

Participants completed the Coping Strategy Indicator (CSI; Amirkhan 1990), a measure developed to assess problem solving, social support seeking, and avoidance (11 items each) in response to a recent problem they encountered in their lives. The Dutch version was validated by Bijttebier and Vertommen (1997). All items were answered on a 5-point Likert-type rating scale, ranging from 1 ("*strongly disagree*") to 5 ("*strongly agree*"). Sample items include "I try to solve the problem" (problem solving), "I talk to people about the situation" (social support seeking), and "I daydream about better times" (avoidance).

Due to space limitations in the questionnaire packet, a short 15-item CSI was developed for the present study. To create the brief version of the CSI, we conducted a pilot study with a separate sample of 356 college students (77.6% women). These participants completed the full-length version of the CSI. Based on a principal component analysis (PCA) with varimax rotation extracting three factors corresponding to the three coping strategies, we selected the five items with the highest factor loadings for each of the three factors (Thompson 2004). Factor loadings for the 15 selected items ranged between .53 and .77 (with no cross-loadings exceeding .35). The correlations between the original and shortened scales were .94 for problem solving, .90 for social support seeking, and .90 for avoidance (all *p*s $< .001$), indicating that the shortened scales adequately represented the original scales. In the pilot sample, Cronbach's alphas for the shortened scales were .75, .85, and .64, respectively.

This reduced set of 15 items was then used in the present study. A PCA with varimax rotation at Time 1 was used to validate the factor-structure of the reduced set of items in the study sample and again indicated the same three-factor structure described in the literature and obtained in the pilot sample. Factor loadings for the 15 retained items ranged between .45 and .83. Cronbach's alphas for problem solving, social support seeking, and avoidance were .68, .86, and .62, respectively, at Time 1, .68, .88, and .63, respectively, at Time 2, and .70, .90, and .69, respectively, at Time 3.

Identity Processes

Participants completed the Dimensions of Identity Development Scale (DIDS), which originally was developed in Dutch and provides highly reliable scores with a clear factor structure in Belgian high school and college student samples (Luyckx et al. 2008a). The DIDS assesses identity processes with respect to future plans and possible life-paths. The identity processes were each measured by five items. Each item was responded to on a 5-point Likert-type rating scale, ranging from 1 ("*strongly disagree*") to 5 ("*strongly agree*"). Sample items include "I have decided on the direction I want to follow in my life" (commitment making), "I sense that the direction I want to take in my life will really suit me" (identification with commitment), "I regularly think over a number of different plans for the future" (exploration in breadth), "I regularly talk with other people about the plans for the future I have made for myself" (exploration in depth), and "It is hard for me to stop thinking about the direction I want to follow in my life" (ruminative exploration). Cronbach's alphas were .92, .87, .84, .76, and .85, respectively, at Time 1, .90, .83, .86, .81, and .86, respectively, at Time 2, and .92, .86, .88, .84, and .88, respectively, at Time 3.

Personality Traits

At Time 1, personality traits were assessed with the Quick Big Five (Goldberg 1992; Vermulst and Gerris 2005). In

this instrument, a 7-point Likert-type scale, with a response format ranging from 1 ("*completely untrue*") to 7 ("*completely true*"), is used to assess the five personality traits (extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience). Traits are measured with 6 adjectives each, such as "worried" (neuroticism), "talkative" (extraversion), "creative" (openness to experience), "sympathetic" (agreeableness), and "systematic" (conscientiousness). Cronbach's alphas were .83, .92, .74, .83, and .92, respectively.

Statistical Analyses

Using cross-lagged path analysis with structural equation modeling (SEM), we examined how coping strategies and identity processes influenced one another over time. A cross-lagged design frequently is used in non-experimental studies to examine temporal sequences over time. This design is characterized by the measurement of two or more variables at two or more points in time, yielding estimates of synchronous (within-time) relationships, autoregressive or stability coefficients, and cross-lagged effects (Asendorpf and van Aken 2003). In addition, in the present study, all cross-lagged effects among the identity processes and among the coping strategies were estimated (Cole and Maxwell 2003). Further, gender was controlled for in all models by allowing covariances between gender and the constructs at Time 1 and by estimating paths from gender to each of the constructs at Times 2–3 (Bollen 1989). We used standard model fit indices to evaluate model fit (Hu and Bentler 1999; Kline 2006). The Chi-square index, which tests the null hypothesis of perfect fit to the data, should be as small as possible; the root mean square error of approximation (RMSEA) should be less than .08 and, preferably, .06; and the Comparative Fit Index (CFI) should exceed .90 and, preferably, .95.

Results

Mean-Level and Correlation Analyses

In a first set of analyses, mean-level analyses were conducted to assess gender differences. Three multivariate analyses of variance, one at each time-point, were conducted across gender. At all time-points, based upon Wilks' Lambda, statistically significant multivariate gender differences were found (Time 1: F (8, 449) = 2.78, $p < .01$, $\eta^2 = .05$; Time 2: F (8, 449) = 3.29, $p < .001$, $\eta^2 = .06$; and Time 3: F (8, 449) = 2.20, $p < .05$, $\eta^2 = .03$). Follow-up univariate analyses, as detailed in Table 1, indicated that, at each time-point, women scored higher than men on social support seeking.

In a next set of analyses, we examined how the study variables related to one another within time-points. Table 2 presents all correlations at Time 1. With respect to coping strategies, problem solving was related positively to social support seeking and unrelated to avoidance. Social support seeking and avoidance were related negatively. With respect to identity processes, the two commitment processes were interrelated strongly, positively related to exploration in breadth and exploration in depth, and negatively related to ruminative exploration. Exploration in breadth and exploration in depth were interrelated positively. Exploration in breadth was related positively, and exploration in depth was not significantly related, to ruminative exploration. Table 3 presents the within-time correlations between coping strategies and identity processes at Times 1–3. Problem solving and social support seeking were related consistently positively to all identity processes except for ruminative exploration. Avoidance was related consistently negatively to identification with commitment and positively to exploration in breadth and ruminative exploration.

Cross-Lagged Analyses

Cross-lagged path analyses proceeded in two steps. In the first step, structural paths (i.e., autoregressive paths and cross-lagged paths) were freely estimated. This model provided an adequate fit to the data ($df = 64$; $\chi^2 = 176.14$; RMSEA = .06; CFI = .97). In the second step, the assumption of stationarity—equivalence of corresponding structural parameters between Times 1–2 and Times 2–3—was evaluated. Each autocorrelation and cross-lagged path was constrained to be equal across the two time intervals, that is, from Time 1 to Time 2 and from Time 2 to Time 3. The model with stationarity imposed provided a good fit to the data, $df = 128$; $\chi^2 = 255.58$; RMSEA = .05; CFI = .97. The null hypothesis of invariant path coefficients across time would be rejected if at least two of the following criteria were satisfied (Cheung and Rensvold 2002; Vandenberg and Lance 2000): $\Delta\chi^2$ significant at $p < .05$; ΔCFI $\geq .01$; and ΔNon-Normed Fit Index (NNFI) $\geq .02$. Although the NNFI was not used to evaluate the fit of a single model (cf. Kline 2006), it is extremely sensitive to small deviations or differences in model fit and is a useful tool in invariance testing (Little 1997). Invariance tests indicated that the more parsimonious invariant model fit the data equally well, $\Delta\chi^2$ (64) = 79.44, $p = .09$; ΔCFI $< .01$; ΔNNFI $< .01$. Consequently, we retained the model with stationarity assumed. In this model, autocorrelations ranged between .20 and .41 for the identity processes and between .32 and .47 for the coping strategies (all ps $< .001$). On a related note, when deleting the relatively small subsample of men and conducting the analyses on the

Table 1 Univariate ANOVAs, means, and F values for gender at Times 1, 2, and 3

Variable	Total sample	Gender		F value (η^2)
		Men	Women	
Time 1				
Commitment making	3.73 (0.84)	3.58 (1.02)	3.76 (0.80)	2.61 (.01)
Identification commitment	3.50 (0.73)	3.47 (0.79)	3.51 (0.72)	0.20 (.00)
Exploration in breadth	3.71 (0.68)	3.72 (0.79)	3.71 (0.66)	0.01 (.00)
Exploration in depth	3.53 (0.66)	3.48 (0.72)	3.53 (0.65)	0.36 (.00)
Ruminative exploration	2.82 (0.86)	2.79 (0.97)	2.82 (0.84)	0.08 (.00)
Problem solving	3.56 (0.64)	3.63 (0.64)	3.55 (0.64)	1.00 (.00)
Social support seeking	3.82 (0.81)	3.52 (0.89)	3.88 (0.79)	11.81*** (.03)
Avoidance	2.74 (0.70)	2.66 (0.71)	2.75 (0.69)	0.92 (.00)
Time 2				
Commitment making	3.58 (0.80)	3.49 (0.77)	3.60 (0.80)	1.05 (.00)
Identification commitment	3.52 (0.70)	3.48 (0.63)	3.53 (0.71)	0.32 (.00)
Exploration in breadth	3.48 (0.75)	3.46 (0.69)	3.48 (0.76)	0.02 (.00)
Exploration in depth	3.31 (0.75)	3.26 (0.70)	3.31 (0.76)	0.33 (.00)
Ruminative exploration	2.82 (0.85)	2.81 (0.80)	2.82 (0.86)	0.01 (.00)
Problem solving	3.55 (0.59)	3.60 (0.54)	3.54 (0.60)	0.62 (.00)
Social support seeking	3.80 (0.79)	3.39 (0.86)	3.87 (0.76)	22.41*** (.05)
Avoidance	2.65 (0.65)	2.66 (0.62)	2.65 (0.66)	0.02 (.00)
Time 3				
Commitment making	3.59 (0.79)	3.44 (0.75)	3.61 (0.79)	2.70 (.01)
Identification commitment	3.52 (0.73)	3.45 (0.72)	3.53 (0.73)	0.68 (.00)
Exploration in breadth	3.53 (0.78)	3.43 (0.82)	3.55 (0.77)	1.33 (.00)
Exploration in depth	3.37 (0.76)	3.30 (0.70)	3.38 (0.77)	0.71 (.00)
Ruminative exploration	2.82 (0.89)	2.81 (0.91)	2.82 (0.88)	.01 (.00)
Problem solving	3.54 (0.58)	3.54 (0.59)	3.54 (0.58)	.00 (.00)
Social support seeking	3.79 (0.79)	3.47 (0.84)	3.84 (0.77)	13.52*** (.03)
Avoidance	2.58 (0.71)	2.61 (0.71)	2.58 (0.71)	.10 (.00)

Standard deviations in parentheses

*** $p < .001$

Table 2 Correlations among study variables at Time 1

Variable	2.	3.	4.	5.	6.	7.	8.
1. Commitment making	.74***	.29***	.45***	−.48***	.16***	.19***	−.06
2. Identification commitment		.24***	.44***	−.53***	.14**	.18***	−.09*
3. Exploration in breadth			.49***	.14**	.20***	.14**	.10*
4. Exploration in depth				−.05	.16***	.22***	.02
5. Ruminative exploration					−.05	−.12*	.23***
6. Problem solving						.21***	.01
7. Social support seeking							−.15**
8. Avoidance							–

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

women only, the parameter values obtained estimated were very close to (or identical to) those found using the full sample. As a result, we report findings using the full sample here.

Table 4 presents the cross-lagged coefficients. With respect to the paths from coping strategies to identity processes, problem solving predicted relative increases in identification with commitment, exploration in breadth,

Table 3 Within-time correlations among identity processes and coping strategies at Times 1–3

Variable	Problem solving			Social support seeking			Avoidance		
	T1	T2	T3	T1	T2	T3	T1	T2	T3
Commitment making	.16***	.33***	.22***	.19***	.12**	.14**	−.06	−.01	−.11*
Identification commitment	.14**	.29***	.27***	.18***	.10*	.12*	−.09*	−.12*	−.10*
Exploration in breadth	.20***	.42***	.33***	.14**	.15***	.10*	.10*	.22***	.11*
Exploration in depth	.16***	.33***	.29***	.22***	.22***	.15***	.02	.09	.12*
Ruminative exploration	−.05	.07	.05	−.12**	.04	.00	.23***	.34***	.36***

T time

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

and exploration in depth over time. Social support seeking predicted increases in commitment making and exploration in depth over time. Finally, avoidance predicted increases in exploration in breadth and ruminative exploration over time. With respect to the paths from identity processes to coping strategies, identification with commitment predicted decreases in avoidance and ruminative exploration predicted increases in avoidance over time. Exploration in breadth and exploration in depth predicted increases in problem solving over time. In addition, exploration in depth predicted increases in social support seeking.

The Role of Baseline Levels of Personality Traits

Table 5 presents the within-time correlations at Time 1 among the Big Five personality traits on the one hand and identity processes and coping strategies on the other hand. Neuroticism was related positively to exploration in depth, ruminative exploration, and avoidance. Extraversion was related positively to both commitment processes, to exploration in depth, and to social support seeking, and negatively to ruminative exploration and avoidance. Openness to experience was related positively to all of the identity processes (except for ruminative exploration) and problem solving. Agreeableness was related positively to all of the identity and coping variables, except for negative associations with ruminative exploration and avoidance. Finally, conscientiousness was related positively to all of the identity processes (except for ruminative exploration) and to problem solving. To control for these relations in the cross-lagged associations between coping strategies and identity processes, we re-estimated the stationarity-assumed model but included covariances between the Big Five traits and the constructs at Time 1 and additional paths from each Big Five trait to each of the constructs at Times 2–3 (Bollen 1989). This model fit the data well ($df = 128$; $\chi^2 = 249.84$; RMSEA = .05; CFI = .97). Virtually all of the significant cross-lagged paths remained significant at $p < .05$ (as can be seen in Table 4), except for the paths from avoidance to exploration in breadth, from exploration in breadth to problem solving, and from ruminative exploration to avoidance (with ps $< .10$). These findings suggest that the cross-lagged effects that we found were not substantially confounded with personality traits.

Ancillary analyses investigated whether the cross-lagged paths linking coping strategies and identity processes were moderated by personality traits. To explore the moderating effects of personality traits, groups of participants with high versus low levels of each of the traits were determined through a median split procedure (Vanhalst et al. 2011). Path analyses for each Big Five trait proceeded in two steps. In the first step, cross-lagged paths linking coping strategies to identity processes (and vice versa) were estimated freely in individuals with high and low levels of each specific trait. In the second step, these parameters were constrained to be equal in both groups of individuals. Invariance tests indicated that the fit of the cross-lagged model was consistent across levels of neuroticism ($\Delta\chi^2$ (30) = 40.88, $p = .09$; ΔCFI < .01; ΔNNFI < .01), extraversion ($\Delta\chi^2$ (30) = 32.27, $p = .36$; ΔCFI < .01; ΔNNFI < .01), openness ($\Delta\chi^2$ (30) = 42.76, $p = .06$; ΔCFI < .01; ΔNNFI < .01), agreeableness ($\Delta\chi^2$ (30) = 43.22, $p = .06$; ΔCFI < .01; ΔNNFI < .01), and conscientiousness ($\Delta\chi^2$ (30) = 45.75, $p < .05$; but ΔCFI < .01; ΔNNFI < .01), respectively. Hence, the over-time associations between coping strategies and identity processes were not moderated by personality traits.

Discussion

Coping strategies and identity processes are hypothesized to influence one another in reciprocal fashion. The present study represents the first attempt to investigate how an expanded set of personal identity processes (commitment making, identification with commitment, exploration in breadth, exploration in depth, and ruminative exploration) and coping strategies (i.e., problem solving, social support seeking, and avoidance) relate to one another over time. We also examined the role that personality traits may have played in these temporal sequences. In line with our expectations, coping strategies and

Table 4 Final standardized cross-lagged path coefficients linking identity processes and coping strategies

Variable	Problem solving		Social support seeking		Avoidance	
	T1 to T2	T2 to T3	T1 to T2	T2 to T3	T1 to T2	T2 to T3
Commitment making						
Coping → identity	.04 (.04)	.03 (.03)	.07* (.08**)	.07* (.08**)	−.01 (−.02)	−.01 (−.02)
Identity → coping	.03 (.04)	.03 (.04)	−.06 (−.06)	−.06 (−.05)	−.02 (.01)	−.02 (.01)
Identification commitment						
Coping → identity	.09** (.08*)	.08** (.07*)	.02 (.03)	.02 (.03)	−.04 (−.03)	−.04 (−.03)
Identity → coping	.01 (−.01)	.01 (−.01)	.01 (−.02)	.01 (−.02)	−.13** (−.13**)	−.12** (−.13**)
Exploration in breadth						
Coping → identity	.10** (.08*)	.08** (.06*)	−.05 (.03)	−.06 (.03)	.08* (.07)	.08* (.06)
Identity → coping	.09* (.07)	.09* (.08)	.01 (−.06)	.01 (−.06)	−.03 (−.04)	−.03 (−.04)
Exploration in depth						
Coping → identity	.11*** (.10**)	.10*** (.09**)	.10** (.10**)	.09** (.09**)	.06 (.06)	.06 (.05)
Identity → coping	.12** (.11**)	.13** (.12**)	.13*** (.12***)	.15*** (.14***)	.04 (.05)	.04 (.05)
Ruminative exploration						
Coping → identity	−.01 (−.01)	−.01 (−.01)	.01 (.03)	.01 (.03)	.12*** (.11***)	.12*** (.10***)
Identity → coping	−.04 (−.05)	−.04 (−.05)	−.05 (−.02)	−.05 (−.02)	.09* (.07)	.09* (.07)

T time. Values between parentheses display the cross-lagged coefficients after baseline personality has been added to the model

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

Table 5 Within-time correlations between Big Five and identity processes and coping strategies at Time 1

Variable	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
Commitment making	.03	.21***	.10*	.28***	.18***
Identification commitment	−.07	.29***	.14**	.30***	.13**
Exploration in breadth	.07	.08	.18***	.14**	.11*
Exploration in depth	.11*	.14**	.15***	.20***	.13**
Ruminative exploration	.21***	−.26***	−.01	−.18***	−.07
Problem solving	.01	.01	.18***	.17***	.21***
Social support seeking	−.01	.30***	−.04	.20***	.02
Avoidance	.21***	−.24***	.08	−.10*	−.03

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

identity processes reciprocally predicted one another over time in general. Before we turn to a discussion of the temporal associations obtained, preliminary analyses indicated that, as expected, women scored consistently higher than men on social support seeking over time (Seiffge-Krenke 2011). To account for these mean-level differences, gender was controlled for in all cross-lagged models estimated. Consequently, the temporal sequences linking coping strategies and identity processes could be interpreted beyond the effects of these mean-level gender differences, again emphasizing the robustness of the findings obtained.

Temporal Sequences: From Coping Strategies to Identity Processes

Meaningful within-time associations between coping strategies and identity processes emerged. Problem solving and social support seeking, two instantiations of engagement coping (Carver and Connor-Smith 2010), were related positively to commitment making, identification with commitment, and exploration in breadth and in depth, but tended to be unrelated to ruminative exploration. In contrast, avoidance related positively to ruminative exploration and to exploration in breadth, but negatively to identification with commitment. These relationships were in line with expectations, except that exploration in breadth related positively to both problem solving and (albeit to a lesser extent) avoidance. More crucially, the latter associations also emerged over time: both problem solving and avoidance predicted relative increases in exploration in breadth. Hence, exploring various identity alternatives was predicted both by problem solving strategies and by avoidance and withdrawal, in which the individual deliberately avoids other people or fantasizes about how things could have turned out differently.

This pattern of findings characterized by significant associations with both pro-active and rather maladaptive coping strategies suggests that exploration in breadth may be a "double-edged sword"—facilitative of adaptive identity formation but also predictive of some degree of maladaptation. On a related note, the internal consistency estimates for the avoidance scale was somewhat lower than those of the two other coping scales (for similar results on the full CSI, see Amirkhan 1990; Bijttebier and Vertommen 1997), potentially indicating that the bandwidth of the avoidance scale used was broader than for the other two subscales. Hence, future research using more fine-grained coping measures should assess which specific disengagement strategy (e.g., fantasizing, brooding about the past) accounts for this association with exploration in breadth. For instance, a broad identity exploration may involve periods of solitude that allow for self-discovery and for a creative and thorough consideration of different identity options. Consequently, avoiding other people and preferring to be alone sometimes could be a functional strategy in terms of identity exploration (Long et al. 2003).

Alternatively, the positive predictive path from avoidance coping to exploration in breadth also can be viewed in light of the importance of goal disengagement (which overlaps with important aspects of avoidance or disengagement coping) for subjective well-being and self-development. Goal disengagement (i.e., withdrawing effort and commitment from reaching certain goals; Wrosch et al. 2003) has been found to be an indispensable aspect of effective self-regulation, especially if the desired goal turns out to be unattainable (Wrosch 2011). When confronted with constrained opportunities for goal attainment, goal disengagement indeed might free up energy and resources for a search for new goals (Wrosch et al. 2003). Translated to the present study, disengaging from certain goals or commitments could lead to a renewed broad exploration into different identity alternatives (Grotevant 1987). As such, disengaging from initially unrealistic or unattainable goals could set the stage for adaptive long-term identity development in which one achieves meaningful alternative goals that are aligned with the person's capacities, needs, and wishes (Wrosch et al. 2003). Future longitudinal research focusing on goal disengagement and identity formation could examine this latter hypothesis.

Identity exploration not only consists of exploring in breadth various identity alternatives but also entails exploring and evaluating current commitments and, for some individuals, can even result in maladaptive worry and rumination. The latter two exploration processes (i.e., exploration in depth and ruminative exploration) were defined by opposing relationships to coping strategies. Whereas problem solving and social support seeking predicted greater amounts of exploration in depth, avoidance predicted increases in ruminative exploration. Exploration in depth and exploration in breadth share some common themes in that they are both characterized, and probably prompted, by being information-oriented and by maintaining an open and flexible approach to life (Berzonsky 2011). As demonstrated in the present study, both are predicted by problem solving-oriented coping strategies. However, exploration in breadth and exploration in depth differ in their target and goal (i.e., choosing from different alternatives vs. evaluating current commitments). Hence, seeking social support and feedback was found to be a primary mechanism for evaluating current commitments, but, as we suggested earlier, less so for broadly considering different potential choices.

With respect to cross-lagged paths from coping strategies to the commitment processes, a differential pattern of results emerged for the two commitment processes. Social support seeking predicted over-time increases in commitment making, whereas problem solving predicted over-time increases in identification with commitment. These findings suggest that social support seeking may serve as a beneficial resource for making identity-related choices (Grotevant 1987; Kerpelman et al. 1997). The foreclosure status described within the identity status paradigm may represent an example of the importance of the social environment in the process of making identity-related choices (Kroger and Marcia 2011). Foreclosed individuals internalize the values and goals of significant others in their lives rather than engaging in self-directed exploration (Marcia 1980). However, the present findings suggest that, for commitments to be integrated in the self, an active problem-solving approach to daily challenges in which alternative options and solutions are considered might be beneficial for some individuals.

Temporal Sequences: From Identity Processes to Coping Strategies

Many of the cross-temporal pathways linking identity exploration to coping strategies appeared to be bi-directional in nature. Exploration in breadth also predicted relative increases in problem solving, exploration in depth predicted relative increases in problem solving and social support seeking, and ruminative exploration predicted relative increases in avoidance. Hence, engaging in adaptive identity processes enables individuals to cope successfully with stressors and challenges encountered in daily life (Berzonsky 1992). Although previous cross-sectional research has suggested similar conclusions (e.g., Luyckx et al. 2008b), the present study is the first to demonstrate such a temporal sequence over time using cross-lagged analysis. Pathways linking the commitment processes to subsequent coping strategies were somewhat less

pronounced than pathways linking the exploration processes to coping strategies: Only identification with commitment predicted relative decreases in avoidance, again underscoring the crucial role of identifying with identity commitments for adaptive psychosocial functioning (Luyckx et al. 2008a).

The many reciprocal mechanisms linking identity exploration to coping strategies obtained in the present study are consistent with Grotevant (1987, p. 204), who viewed exploration as the work of identity: "identity exploration may be defined as *problem-solving behavior* aimed at eliciting information about oneself or one's environment in order to make a decision about an important life choice" (italics added). Collectively, some of the present findings involving identity exploration point to the existence of potential upward spirals toward positive self-development. Individuals who cope well advance in their adaptive identity exploration; and their adaptive identity exploration, in turn, seems to foster the development of adaptive coping strategies. This latter finding may be due to the fact that exploration increases self-knowledge and self-complexity. As individuals explore new commitments and ideas, they indeed build their psychological resources which could enable them to cope in a pro-active manner (Fredrickson and Joiner 2002). In contrast, other findings seemed to point to the existence of negative spirals or vicious circles in which avoidant coping strategies lead individuals to worry and ruminate about identity options, which, in turn, seems to play into avoidant coping strategies. In sum, the interdependence of identity exploration and coping strategies should be examined further in future long-term longitudinal research efforts. Such research could generate important information for intervention efforts targeting individuals who are identity diffused and experience substantial difficulties in daily functioning.

Exploring the Role of Personality Traits

With respect to personality traits, the present pattern of findings was consistent with expectations for both identity processes and coping strategies. Neuroticism was positively related to ruminative exploration and avoidance, but generally was unrelated to the more adaptive identity processes and coping strategies. The reverse pattern of findings was found for the other Big Five traits, with some specific qualifications depending on the trait under consideration. For instance, whereas social support seeking was related positively to extraversion and agreeableness, it was unrelated to openness to experience and conscientiousness. Hence, the present findings on the concurrent relationships between the Big Five personality traits and identity processes generally were in line with previous research.

However, despite these meaningful baseline associations of identity processes and coping strategies with the Big Five traits, the majority of the cross-lagged paths between identity and coping remained significant when controlling for all of the Big Five traits. In addition, ancillary analyses demonstrated that the Big Five traits did not moderate the cross-temporal pathways linking coping strategies to identity processes. Apparently, these longitudinal linkages appeared to function similarly for individuals with different personality profiles. For example, exploration in breadth was positively predictive of problem-focused coping both for individuals high and low in neuroticism. These findings underscore the robustness of the cross-temporal pathways linking identity processes to coping strategies and indicate that personality traits do not play a substantial role in these pathways.

Limitations and Suggestions for Future Research

Before we discuss the limitations of the present study, it should be emphasized that some of the cross-lagged coefficients described earlier were rather modest, but readers should note that these coefficients were obtained while simultaneously controlling for all synchronous associations, autoregressive paths, and all cross-lagged paths among the identity processes and among the coping strategies. Further, such relatively modest coefficients could be expected given that identity and coping are multiply determined (cf. Swann et al. 2007).

This being said, the present study is characterized by several limitations which provide avenues for future research. First, although self-reports are most appropriate to gather information about internal and subjective processes such as identity processes and coping strategies, collecting all data from a single informant might artificially inflate correlations among constructs (Podsakoff et al. 2003). Hence, future research could try to include observational or other-reported measures assessing coping strategies in confrontation with specific stressors (e.g., family conflict; Seiffge-Krenke 2011). However, it should be noted that in the present study shared method variance was statistically removed by controlling for synchronous associations and autoregressive paths (Orth et al. 2008).

Second, the present sample was drawn from a predominantly female student population from a specific background (i.e., students in Psychology and Educational Sciences). This unbalanced gender distribution was representative of the population sampled and, hence, allows for generalizations towards this specific population of college students. However, to allow for generalizations to other segments of emerging adults, future research should focus on diverse samples that are more balanced in terms of gender so that the findings are not weighted in favor of

either gender. Relatedly, the present sample was comprised largely of Caucasian European participants. Hence, it remains to be investigated how the different variables assessed in the present study interrelate in non-Western cultures or in non-Whites living in Western cultures.

Third, the time-span under consideration was relatively short. Given that major developmental changes in the variables under study are likely to occur primarily in the long term, longitudinal research is needed to track coping strategies and identity processes from adolescence well into the adult years. Such research also might investigate how changes in coping strategies and identity processes relate to psychosocial outcomes such as self-esteem, depression, drug use, and health risk behaviors. In doing so, future research should rely on more fine-grained measures of coping that more fully represent the various coping strategies identified in the literature.

Conclusion

Despite these limitations, we believe that the present results substantially broaden our knowledge of how identity processes and coping strategies mutually predict one another over time. Processes of identity exploration seem especially to be intertwined with both engagement and disengagement coping strategies over time. Further, engagement coping strategies such as social support seeking and problem solving were found to predict commitment making and identification with commitment, respectively. These pathways were obtained when simultaneously controlling for the Big Five personality traits that have been shown to relate both to coping strategies and identity processes. We encourage researchers to examine similar research questions in different populations and settings and to assess how the interplay between identity and coping relates to daily functioning across time.

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