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# Episodic memories as building blocks of identity processing styles and life domains satisfaction: Examining need satisfaction and need for cognitive closure in memories

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The interconnection between identity and memory is widely accepted, but the processes underlying this association remain unclear. The present study examined how specific experiential components of self-defining memories relate to identity processing styles. We also investigated whether those relationships occurred in a domain-specific manner. Participants ( $n = 583$ ) completed the Identity Style Inventory-3, which we adapted to measure identity in the school and friend domains, as well as scales assessing their friend and school satisfaction. They then described a memory related to each of these domains and rated the level of need satisfaction and need for cognitive closure characterising each memory. Results from structural equation modeling revealed that need satisfaction in the school-related memory was positively associated with an informational identity style at school and with satisfaction at school, whereas need satisfaction in the friend-related memory was positively associated with an informational identity style in both the school and friend domain, and with satisfaction with friends. In addition, need for cognitive closure in both the friend- and school-related memory was associated with normative friend and school identity processing styles. These findings reveal that specific experiential components of self-defining memories are associated with certain identity processing styles. Furthermore, this relationship appears to be mostly domain-specific.

**Keywords:** Identity styles; Self-defining memories; Experiential component; Domain-specificity.

The idea that people use their own experiences to define their identity is unlikely to spawn controversy. Many researchers claim that identity and memory are profoundly interconnected (Conway & Pleydell-Pearce, 2000; Habermas & Bluck, 2000; Klein & Nichols, 2012; McAdams, 1985; Singer & Salovey, 1993). Nevertheless, the processes through which these connections develop and organise themselves are still unclear. Recently, some researchers have started to investigate identity statuses or identity processing styles (McLean & Pasupathi, 2012;

McLean, Syed, Yoder, & Greenhoot, 2014), which can further increase our understanding of the relationship between memories and identity development. However, several questions remain. What types of memory are associated with identity processing styles? What components of memories relate to identity styles? Is the relation between identity styles and memory context-specific? Are episodic memories solely associated to identity and identity processing styles or does this relation extend to general life outcomes? The purpose of the present research was

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to address these issues in the hope of shedding more light on the associations between specific experiential components of memories and certain identity processing styles within specific life domains.

### Life story

A notable approach that investigated the relationship between how one remembers past events and identity is the approach of *narrative identity*, pioneered by Dan P. McAdams (1985). A central tenant of this perspective is that identity is formed through summarising past experiences in a narrative form, hence creating a personal *life story*. Research has shown that themes emerging from life story narratives were correlated with their author's personality and general functioning (McAdams, 2008; McLean, Pasupathi, & Pals, 2007). For instance, themes related to agency (i.e., power, autonomy, achievement) and communion (i.e., intimacy, belongingness) in life story narratives were found to relate to personality traits, motives and psychological well-being (McAdams, 1982; McAdams, Hoffman, Day, & Mansfield, 1996; Woike, Gershkovich, Piorkowski, & Polo, 1999).

Research has also shown that a coherent life story is positively associated with subjective well-being and adaptive psychological traits and motives (Baddeley & Singer, 2007; Baerger & McAdams, 1999; McAdams, 2008; McLean et al., 2007). To account for the process through which a coherent life story is continually formed, revised and used, Habermas and Bluck (2000) introduced the concept of autobiographical reasoning. They defined it as a process of self-reflective thinking that involves forming links between events of one's life in an attempt to relate one's personal past and present, and to understand them in a coherent way. They suggested that establishing thematic similarity between past events is one of the essential processes leading to life story's coherence. For instance, different life narratives regrouped into thematic categories such as "life is a struggle" (Ruth, Birren, & Polkinghorne, 1996) or themes of intimacy and power (Mansfield & McAdams, 1996) are brought together in a coherent whole by their thematic similarity, and these themes provide a basis for a more meaningful and consistent identity. Overall, research on the life story has revealed that emerging themes in memories of past events (or life narratives) help to build a sense of narrative identity.

### Self-defining memories

It is obvious that not all memories of past events are equally important to one's identity. For instance, a memory of eating cereals yields little self-relevant information compared to a memory of a major life transition such as getting married or moving to another country. Singer and Salovey (1993) called this latter type of memories of meaningful and important life events *self-defining memories*. They defined them as specific types of autobiographical memories that are vivid, emotionally intense, repetitively recalled, highly accessible, linked to a network of similar memories and connected to unresolved conflicts or enduring concerns. Singer and Salovey suggested that networks of self-defining memories provide a major part of the active content of the self. They postulated that self-defining memories provide the pool of knowledge about oneself from which self-images emerge (Singer & Salovey, 1993), and therefore expected a relation between personal characteristics and the content and structure of self-defining memories. Accordingly, Blagov and Singer (2004) showed that individuals' self-defining memories that contained reflective themes had higher levels of self-restraint and lower levels of repressive defensiveness as measured by the Weinberger Adjustment Inventory (Weinberger, 1997). Moffitt, Singer, Nelligan, Carlson, and Vyse (1994) also found that individuals with higher depression scores recalled significantly less specific self-defining memories when asked to recall a positive memory than participants with lower depression scores. Since depressed individuals are known to hold negative self-images, the fact that they tend to have less specific positive than negative self-defining memories supports the contention that self-defining memories are linked to self-images (Singer & Salovey, 1993).

Conway, Singer, and Tagini (2004) proposed that self-defining memories play a crucial role in defining and maintaining important long-term goals relevant to the self. They argued that self-defining memories are centrally involved in a mutual interplay between episodic memories and long-term self (Conway et al., 2004) and postulate that self-defining memories operate under the bidirectional influences between memory and the self. For instance, their model suggests that when the self undergoes a major transition, due to a change in an important goal or life context, new self-defining memories are elected from existing

autobiographical memories to better fit with the new self. In sum, the self and identity appear to be intimately related to self-defining memories and such memories seem to be critically involved in the process through which self-relevant information is integrated to the self and identity. Therefore, self-defining memories should be implicated in identity processing styles, the social-cognitive strategies people use to integrate self-relevant information to form identity.

### Identity processing styles

Research reviewed above sought identity markers in individual reminiscences and narratives of life events (e.g., Blagov & Singer, 2004; King & Noelle, 2005; McAdams, 2001; McLean & Breen, 2009). Another major line of research on identity has spawned from Marcia's measure of four identity statuses (Marcia, 1966). Berzonsky (1988) suggested that these statuses reflected three underlying processing styles—informational, normative and diffuse identity processing styles—and that these refer to relatively stable differences in the social-cognitive strategies that individuals use to cope with identity conflict and to integrate self-relevant information. As such, identity processing styles do not address the content of identity, but the way self-relevant information is integrated into identity.

Individuals with a preference for an *informational* identity processing style intentionally seek out self-relevant information (Berzonsky, 2011). They commit to long-term goals in accordance with a genuine self-exploration process. They are capable of modifying their self-images in the face of new information revealing its dissonance or bad fit with the person. In contrast, individuals with a preference for a normative identity processing style approach self-relevant information with rigidity and close-mindedness (Berzonsky, 2011). They have a strong tendency to base their self-view on existing norms and to internalise goals and standards that their groups and/or significant others hold as the “right” ones. In addition, they prefer to protect existing self-views over reviewing them, even in the light of disconfirming information. Finally, individuals with a preference for diffuse identity style make little use of self-reflection and avoid dealing with identity conflict and commitment issues (Berzonsky, 2011). When pressured to do so, they base their important life decisions primarily on situational demands and

circumstances (Berzonsky & Ferrari, 2009). These individuals lack the identity clarity and stability that are characteristics of normative and informational processing styles.

So far, research examining the relation between identity and memory has sought specific themes in life story narratives (e.g., McAdams, 2001) and in self-defining memories (e.g., Singer & Salovey, 1993), considering those thematic memory components as being a marker of identity. We believe that assessing the association between self-defining memories and identity processing styles could extend research on identity and memory. Rather than looking for themes reflecting identity in memories, investigating how specific memory components are linked to specific identity processing styles, measured as separate constructs, should highlight a different perspective onto the relation between memory and identity. In accordance with Conway et al. (2004) proposition that self-defining memories continually interact with long-term identity, we expected that self-defining memories would be associated with certain processing styles of self-relevant information.

*Identity processing styles and the experiential components of episodic memories.* One important question that remains is to understand what is it exactly in memories that is associated to specific identity processing styles. Episodic memories preserve experience-near sensory-perceptual traces of significant events that represent what the person experienced at that moment (Conway, 2008; Wheeler, Stuss, & Tulving, 1997), which have been called the experiential components of episodic memories. Philippe and his colleagues (Philippe, Koestner, Beaulieu-Pelletier, & Lecours, 2011; Philippe, Koestner, Beaulieu-Pelletier, Lecours, & Leles, 2012) provided evidence that, in line with self-determination theory (Deci & Ryan, 2000), remembered level of satisfaction of three important psychological needs (autonomy, competence and relatedness) is a basic experiential component of episodic memories, one that is distinct from several other memory characteristics (e.g., valence, explicit and implicit motives, intrinsic and integrative memories). Need satisfaction in important episodic memories have been shown to impact emotion, well-being and relational behaviour (Philippe et al., 2011, 2012; Philippe, Koestner, & Leles, 2013) by promoting openness, that is, an accurate and undistorted perception of experience and a willingness to assimilate novel experiences into

the self (Hodgins & Knee, 2002; Philippe et al., 2012). For instance, Philippe et al. (2012) showed that unconsciously priming need satisfying self-defining memories led to an immediate increase in situational well-being and to enduring increases in well-being over one year. Similarly, need satisfaction in couple-related memories were found to predict increases in relationship quality one year later, and to negatively predict relationship dissolution, even after controlling for prior relationship quality and attitudes towards the partner (Philippe et al., 2013).

Experiential components of self-defining memories could be associated with identity processing styles. An informational identity processing style involves intentionally seeking out novel information to deal with identity issues and an openness to re-evaluate aspects of one's self-constructions (Berzonsky, 2003). Need satisfaction typically facilitates lower level of defensiveness and a greater openness to novel information (e.g., Hodgins & Knee, 2002; Hodgins, Yacko, & Gottlieb, 2006). Corroborating this position, Soenens, Berzonsky, Vansteenkiste, Beyers, and Goossens (2005) found that autonomous causality orientation, a variable that typically facilitates need satisfaction, was positively related to an informational identity processing style, but unrelated to a normative processing style (also see Soenens, Berzonsky, Dunkel, Papini, & Vansteenkiste, 2011). On the basis of this theoretical and empirical support, we hypothesised that need satisfaction in self-defining memories would be associated with informational identity processing style but not with normative processing style. Indeed, self-defining memories that are characterised by need satisfaction should be related to that openness to new information and re-evaluation characterising an informational processing style.

Normative identity processing style characterises people's tendency to internalise the values and beliefs of others, with little volition, in order to minimise or avoid self-reflection. These individuals prefer to remain closed to novel information that may threaten their internalised self-constructions (Berzonsky, 2003). Thus, self-defining memories characterised by the need for order, closure, clarity, predictability and simple decision-making (corresponding to need for cognitive closure, Webster & Kruglanski, 1997), may be associated with this closure to novel information and increased reliance on norms characterising a normative processing style. To our knowledge,

need for cognitive closure has never been studied as an experiential component of memory.

The reverse relationship—identity processing styles influencing memories—is also plausible, because of the bidirectional nature of memories and identity (Tessler & Nelson, 1994) and potentially of identity processing styles. For example, memories are sometimes reconstructed in order to better correspond to one's current identity (Conway et al., 2004; Pillemer, 2001) and what is recalled often reflects the person's identity developmental stages (McLean & Breen, 2009; Wilt, Cox, & McAdams, 2010) or self-schemas (Barclay & Subramaniam, 1987; Markus, 1977). As such, the purpose of the present study is not to posit a specific direction to this relationship but to examine the associations between specific experiential components of memories and certain identity processing styles.

*Domain-related identity processing styles.* Much research suggests that both identity and self-defining memories would be better understood as divided in separate domains (Conway & Pleydell-Pearce, 2000; Higgins, 1987; Markus & Nurius, 1986; McConnell, 2010; Roberts & Donahue, 1994). For instance, McConnell's multiple self-aspects framework stresses the multiplicity and context-dependency of the self and argues against conceiving the self as a global and unitary entity (McConnell, 2010). Research by McLean et al. (2014) also showed that the integration of various identity domains via meaning-making matters for psychosocial development, pointing to the importance of assessing multiple identity domains. Hence, if we understand identity as circumscribed to domains, we should expect the relation between self-defining memories and identity to be mostly domain-specific (e.g., university, work, friendship, etc.) and therefore that people could use specific identity processing styles in certain domains and not in others. To investigate that possibility, in the present study, we assessed the relationship between experiential components (need satisfaction and need for cognitive closure) of *domain-specific* self-defining memories and identity processing styles *in specific domains*.

## THE PRESENT STUDY

The present study examined the association between the experiential components of need satisfaction and need for cognitive closure in

self-defining memories of specific domains and domain-related identity processing styles. We hypothesised that self-defining memories characterised by the experience of need satisfaction would be associated with informational identity processing styles and that self-defining memories characterised by the experience of a need for cognitive closure would be associated with normative identity processing styles. In addition, we expected these relationships to be specific to the domain assessed. To test these hypotheses, we asked participants to retrieve two self-defining memories, one related to the domain of school and the other related to the domain of friendship, and we measured identity processing styles specific to each of these domains. In addition, we also assessed satisfaction outcomes in the school and friend domains. Based on past research (Berzonsky, 1989, 2011), we expected that informational identity processing styles in one domain would be positively associated with satisfaction in that domain, whereas normative identity style would be either unrelated to or negatively associated with its respective domain satisfaction.

We also wanted to investigate if the associations between self-defining memories and outcomes would be restricted to identity processing styles (full mediations) or if they would also be associated with outcomes over and above identity (partial mediations). Episodic memories have been shown to contribute to important life outcomes, over and above traits, identity variables and attitudes (e.g., Kuwabara & Pillemer, 2010; Milyavskaya, Philippe, & Koestner, 2013; Philippe et al., 2013). As such, memories' role does not appear to be restrained to building identity, but to also directly affect several important life outcomes through its directive function (Pillemer, 2003). Consequently, we hypothesised that self-defining memories would be associated with domain-related identity processing styles as well as with domain-related satisfaction and that this latter relationship would hold even after controlling for identity processing styles. In line with the domain-dependent hypothesis, each memory was also expected to be related to outcomes in its respective domain only.

## METHOD

### Participants and procedure

A total of 581 undergraduate/graduate students (443 females, 138 males) from a Canadian

university took part in this study. Participants' mean age was 27.68 years ( $SD = 7.84$  years). They were contacted through their university email and informed that we were conducting an online study on identity and memory. As an incentive, participants were entered into a draw for one of three prizes of \$125.

### Measures

*Identity processing styles.* A french version (Zimmermann, Mahaim, Mantzouranis, Genoud, & Crocetti, 2012) of the Identity Style Inventory-3 (ISI-3; Berzonsky, 1992) was used to assess participants' identity processing styles. The ISI-3 is a widely used 40-item scale measuring information, normative, commitment and diffuse identity orientations. In this study, only the information and normative orientations were assessed, since our hypotheses only tapped these two orientations.

We adapted items of the original ISI-3 to tap friend and school identity processing styles. For instance, original items of the ISI-3 such as "I've spent a great deal of time thinking seriously about what I should do with my life" (informational item) or "Once I know the correct way to handle a problem, I prefer to stick with it" (normative item) were modified to "I've spent a great deal of time thinking seriously about with whom I should spend time with in life" and "Once I know the correct way to handle a problem related to my friends, I prefer to stick with it" to assess friend identity processing styles. The same items were also slightly modified to assess school identity processing styles: "I've spent a great deal of time thinking seriously about what domain I should specialized myself in at school" and "Once I know the correct way to handle a problem related to school, I prefer to stick with it". Only five items of the informational and normative orientations were adaptable to friend and school dimensions without changing their original meaning. This adaptation of the original ISI-3 to a domain-specific version is unique, since no research has yet sought to empirically examine domain-specific identity processing styles. Participants were asked to rate all items on a 5-point Likert scale (1 = *do not agree at all*; 5 = *totally agree*).

We conducted an exploratory factor analysis to test the factorial structure of our new domain-specific version of the ISI-3. This analysis yielded four factors that corresponded to the normative and informational dimensions of the friend and

school domains. Most loadings were satisfying (above .39); except for one normative item whose loading was .30. However, one of the five items of the original normative dimension did not load on its respective friend or school normative dimension and was therefore excluded. To ensure that each identity style had the same number of items, only four items (randomly selected) of both informational domains were kept. Cronbach's alphas were .56 for the friend and .52 for the school normative dimensions and .61 for both the friend and school informational dimensions. These coefficients are lower than those of the original informational ( $\alpha = .70$ ) and normative ( $\alpha = .64$ ) dimensions (Berzonsky, 1992), which is expected given that our adapted subscales are composed of fewer items than the original ones and that the alpha coefficient formula is strongly affected by the number of items of a scale (Cronbach, 1951).

*Friend and school satisfaction.* We adapted the items of the Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 1985) to tap satisfaction in the friend ( $\alpha = .90$ ) and school ( $\alpha = .88$ ) domains. Sample items for satisfaction in the friend domain are "In most ways my friendships are close to my ideal" and "I am satisfied with my friends". Sample items for satisfaction in the school domain are "In most ways, my academic life is close to my ideals" and "I am satisfied with my academic life". All items were averaged in an index measuring satisfaction in the friend domain ( $a = .90$ ) and the school domain ( $a = .88$ ).

*Episodic memory.* Participants described one memory related to the friend domain and another memory related to the school domain. Instructions were derived from past research on self-defining memories (Singer & Salovey, 1993; Sutin & Robins, 2005). The questionnaire asked the participants to describe:

a personal memory of a specific event or moment that you experienced *with one or more of your current friends* [or at school] which was significant (important) for you. Choose a memory that is at least three months old and that often comes to your mind. This memory can be positive, negative, or both.

The order of the friend and school memory description was counterbalanced.

*Ratings of memory characteristics.* After describing their memory, participants were asked to rate a number of items. A first set of three items used in past research (Philippe et al., 2011, 2012) asked the participants to rate the degree of need satisfaction they experienced at the moment the event of their memory occurred. Participants made their ratings on a 7-point Likert scale ranging from  $-3$  (*strongly disagree*) to  $+3$  (*strongly agree*), with 0 representing *Do not agree nor disagree or not applicable*—this latter option indicating that there was both need satisfaction and need thwarting in the event or that need satisfaction was not present in the event. One item assessed each of the three psychological needs postulated by self-determination theory (i.e., autonomy, competence and relatedness). The item for autonomy is "I felt free to do things and to think how I wanted", for competence: "I felt confident of myself" and for relatedness: "I felt connected to one or more people". All items were averaged in an index measuring need satisfaction in the friend memory ( $a = .79$ ) and the school memory ( $a = .75$ ).

A second set of five items asked participants to rate the degree to which they experienced the need for cognitive closure (Webster & Kruglanski, 1997) at the moment the event of their memory occurred. One item was created for each dimension of the need for cognitive closure scale, that is, preference for order ("I would have preferred the situation to be more ordered"), preference for predictability, ("I would have preferred the situation to be more easily foreseeable"), decisiveness ("I would have preferred to make the decisions I made in that situation more easily"), discomfort with ambiguity ("I would have preferred the situation to be clearer") and closed-mindedness ("I would have preferred getting the opinion of someone else to act in that situation"). These items' wording closely match the definitions of each dimension of the need for closure scale (see Webster & Kruglanski, 1997). All items were averaged in an index measuring need for cognitive closure in the friend memory ( $a = .89$ ) and the school memory ( $a = .91$ ).

## RESULTS

Table 1 presents the means, standard deviations and correlational results of all study variables. Friend informational identity style was positively associated with friend satisfaction but not with school satisfaction. School informational identity style was positively associated with school

TABLE 1

Means, standard deviations, and correlations among identity processing styles, domain satisfaction, and memory characteristics

Variables	M	SD	1	2	3	4	5	6	7	8	9
(1) Friend IF identity	3.51	0.70	–								
(2) School IF identity	3.79	0.68	.50**	–							
(3) Friend NR identity	2.83	0.73	.06	–.02	–						
(4) School NR identity	2.99	0.75	.02	.05	.63**	–					
(5) Friend satisfaction	3.87	0.67	.29**	.19**	.02	–.01	–				
(6) School satisfaction	4.78	1.28	.08	.28**	–.02	.06	.27**	–			
(7) Friend-memory NS	1.12	1.53	.10*	.13**	–.01	–.01	.25**	.20**	–		
(8) School-memory NS	0.94	1.53	.07	.20**	.05	–.04	.13**	.30**	.12**	–	
(9) Friend-memory NFC	–0.21	1.68	–.04	–.08	.13**	.12**	–.20**	–.18**	–.66**	.09*	–
(10) School-memory NFC	–0.28	1.65	.05	–.08	.18**	.14**	–.10*	–.19**	–.05	–.64**	.26**

*n* = 581.

NR, normative; IF, informational; NS, need satisfaction; NFC, need for closure.

\**p* < .05; \*\**p* < .01.

satisfaction and weakly positively associated with friend satisfaction. Both friend and school normative identity processing styles were unrelated to school and friend satisfaction. These results replicate past research on identity processing styles, showing that an informational style contributes to positive outcomes (Berzonsky, 1992). Also replicating past research (Milyavskaya et al., 2013; Philippe et al., 2013), need satisfaction in memories for different domains (herein friend and school) were only weakly positively correlated with each other. Need for cognitive closure in both memories were also weakly positively correlated. These results support the assumption that the characteristics of distinct memories do not largely reflect personal attributes such as traits. Rather, each memory is unique and is associated independently one from another to domain identity processing styles and outcomes.

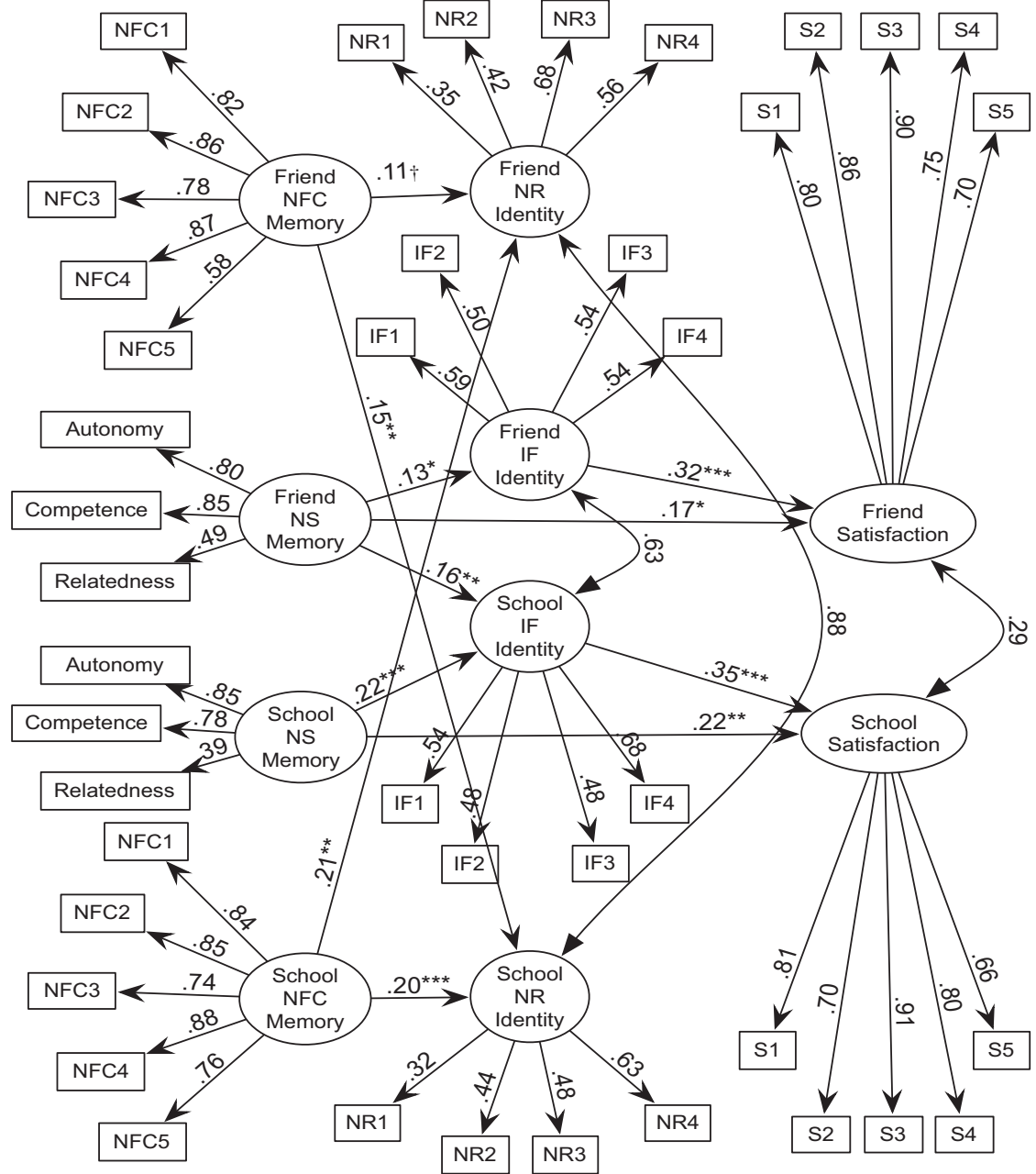
Need satisfaction in the friend memory was positively associated with friend and school informational identity as well as with friend and school satisfaction. Need satisfaction in the school-related memory was positively associated with school informational identity as well as with friend and school satisfaction. Need for cognitive closure in the friend- and school-related memory was positively associated with friend and school normative identity processing styles and negatively associated with friend and school satisfaction. Need satisfaction in the friend memory was negatively associated with need for cognitive closure in the friend memory, and need satisfaction in the friend memory was negatively

associated with need for cognitive closure in the friend memory.

We conducted structural equation modeling (SEM) in order to test our model while controlling for all associations among the variables. Our model was composed of four exogenous latent variables (need for cognitive closure in the friend and school memories, and need satisfaction in the friend and school memories) and six endogenous latent variables (school and friend informational and normative identity processing styles and school and friend satisfaction). Covariances were also freely estimated between the two normative identity processing styles, the two informational identity processing styles, and between the two domains satisfaction. The correlations between the measurement errors of the same items of each processing style in the other domain were also estimated. Memory characteristics were modelled to predict identity processing styles, which in turn were modelled to predict domain satisfaction. In addition, memory characteristics were also modelled to directly predict domains satisfaction (partial mediations). Figure 1 shows the final model. Fit indices for this model were satisfactory,  $\chi^2(770, N = 581) = 1376.251$ , *p* < .01, standardised root mean square residual = .047, root mean square error of approximation = .037 [.034; .040], comparative fit index = .94 and Tucker–Lewis index = .94.

Need satisfaction in the school and in the friend memories were both positively associated with school and friend informational identity processing styles, respectively, but not with normative identity processing styles. Need satisfaction





**Figure 1.** Structural equation model of the associations among need satisfaction and need for cognitive closure in both friend and school memories, friend and school identity processing styles, and friend and school satisfaction. Covariance among the latent variables and non-significant associations were not shown for the sake of clarity, but were all included in the model.

S, Satisfaction; NR, normative; IF, informational; NS, need satisfaction; NFC, need for cognitive closure.

† $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

in the school memory was only associated with informational school identity processing style, whereas need satisfaction in the friend memory was associated with both informational identity processing styles. Conversely, need for cognitive closure in the friend and school memories were positively associated with both school and friend

( $p = .059$ ) normative identity processing style but not with any of the informational identity processing styles. These results suggest that different characteristics of a same memory (need satisfaction and need for closure) are linked to different identity processing styles, either an informational or a normative one. Moreover, need satisfaction

in memories appear to be more domain-specific than need for closure.

The other part of the sequential model sought to examine the contribution of identity processing styles to friend and school satisfaction. It also investigated whether memories would be strictly associated to identity processing styles or if they would also directly be linked to friend and school satisfaction, over and above identity processing styles. As can be seen in [Figure 1](#), informational friend identity was positively associated with friend satisfaction only, whereas informational school identity was positively associated with school satisfaction only. Normative identity styles did not predict either types of satisfaction. Of importance, need satisfaction in the friend memory was positively associated with friend satisfaction only, whereas need satisfaction in the school memory was positively associated with school satisfaction only. These results were obtained while controlling for the associations among all memory characteristics and identity processing styles and school and friend satisfaction. In other words, need satisfaction in memories were uniquely associated with satisfaction in the domain in which the event of the memory occurred, over and above domain-related identity processing styles and other memory characteristics. These results not only highlight the role of the episodic level of experience in identity processing styles but also in important life outcomes.

## DISCUSSION

The present study sought to examine the associations between memory and identity processing styles in specific domains. Our main results support the existence of this association: the experiential components of need satisfaction and need for cognitive closure in self-defining memories were significantly associated with specific identity processing styles. Indeed, need satisfaction in self-defining memories were positively associated with informational identity processing styles, whereas need for cognitive closure in the same memories were positively associated with normative identity processing styles. These results support the idea that specific experiential components of memories are related to certain styles of identity processing. Furthermore, these results supported our assumption that need satisfaction in key self-defining memories would promote an openness towards self-relevant information, leading to an

informational identity processing style, whereas need for cognitive closure would promote avoidance of self-relevant information and lead to a normative identity processing style. These findings are of importance for both research on identity processing styles and self-defining memories.

This study suggests that a single memory can encompass multiple experiential components, and that each one is independently associated to distinct outcomes. This implies that the various experiential components of a single episodic memory can each be related with different aspects of personality, such as identity processing styles, which further affirms the relevance of assessing experiential components of memories. The fact that a single memory was associated to distinct identity processing styles may appear surprising given the relative orthogonality existing between informational and normative processing styles (e.g., Berzonsky, 1989, 2004; Berzonsky et al., 2013). Orthogonality, however, does not imply a mutually exclusive relationship, which would be represented by an at least moderate negative association between the two styles. The relative null relationship existing between informational and normative identity styles in a same domain rather implies that, grossly, some people use high level of one style and low level of the other, but also that some other people use high or low levels of both styles. A memory that would include both need satisfaction and need for cognitive closure would be related to high scores of both informational and normative processing styles, and thus contribute to explain a part of the orthogonality existing between these styles.

The fact that need for cognitive closure in each memory was associated with normative identity styles in *both* domains may imply that they actually reflect an underlying personality trait. We believe our data rule out this alternative explanation. The SEM presented controls for the shared variances among all memory components and among all domain identity processing styles. Therefore, whether domain-specific relationships are shown or not, if the memory components, such as need for cognitive closure, of two distinct memories are independently related to another variable, this means that each relates independently of each other to that other variable. If memories were only a proxy variable reflecting the influence of a trait, when memories would be pitted against each other they would cancel each other out or only one of these memories would emerge as significant. Our

results clearly demonstrate that need for closure in each memory is uniquely associated with normative identity styles, albeit not in a domain-specific manner.

We replicated past findings that need satisfaction is associated with openness and flexibility (Deci & Ryan, 2000), herein characterising informational identity style (Berzonsky, 2011) and that need for cognitive closure is associated with rigidity and close-mindedness (Webster & Kruglanski, 1997) herein characterising normative identity style (Berzonsky, 2011). The present study extends these results by showing that these effects are also found when need satisfaction and need for cognitive closure are assessed at the episodic level. Finally, the positive associations between informational style and domain satisfaction extend research on identity processing styles and show that, at least in early adulthood, informational processing style is a better predictor of satisfaction than normative processing style.

### Domain-specificity

Our hypothesis of domain-specificity received mixed support. First, need for cognitive closure in each of the two memories was associated with *both* domains identity processing styles. However, need satisfaction in memories displayed domain-specificity in four associations out of five: need satisfaction in the school-related memory was uniquely associated with school satisfaction and school informational identity processing style. In the friend-related memory, need satisfaction was not only associated with friend informational identity processing style and friendship satisfaction but also with school informational identity processing style. We controlled for the associations among all memory characteristics and identity processing styles in order to ensure that these associations were specific to the unique memory assessed, and not due to memory characteristics and identity processing styles from other domains.

Our test of domain-specificity was stringent since school and friendship are two domains that overlap a great deal; friends are often met in the context of school, especially among a sample of young adults such as ours. The fact that need satisfaction remained mostly domain-specific (four out of five associations), even with overlapping domains, makes this finding robust. Contrastingly, the fact that need for cognitive closure did not display domain-specificity may imply that

need for cognitive closure is unrelated to context-specific identity structures. These findings have implications with regard to the life story paradigm. Indeed, whereas narrative identity is often measured using a compound of multiple memories in narrative research, the present study suggests that some types of experiential components in different memories are associated with specific context-dependent aspects of identity processing styles. Therefore, averaging themes together across distinct memories might overlook an important aspect of identity processes.

We have found that informational identity processing style was associated with memory components and satisfaction outcomes in a domain-specific manner. This result is of importance for identity research since it provides indirect evidence in favour of the multiplicity and context-dependency view of identity (Conway & Pleydell-Pearce, 2000; Higgins, 1987; Markus & Nurius, 1986; McConnell, 2010; Roberts & Donahue, 1994), but here in terms of domain-specific identity processing styles. As such, identity processing styles do not seem to reflect a global and unitary process at least as long as informational identity processing styles is concerned. Rather, they seem to be fairly differentially associated with specific memory components in domain-specific memories and to show relationships with specific domain satisfaction (school or friend). Conversely, normative identity processing style could reflect a more global and unitary process, as it was not associated with memory components in a domain-specific manner and both domains normative identity styles were highly correlated with each other ( $r = .88$ ). These results suggest that the same socio-cognitive strategies characterising normative identity processing style would be applied across contexts. Conversely, the strategies underlying an informational identity processing style would differ from one context to another (e.g., something can be true in one context, but not in another). Further research is needed to substantiate these claims.

### Heterarchical model

We now wish to draw attention to an epistemological implication of our results: Our study provides support for an heterarchical model of episodic memories and identity processing styles, as opposed to an hierarchical model. An hierarchical model would imply that mental representations are organised from the most basic and simple units

(e.g., self-defining memories) at the bottom end of the hierarchy to the most global and abstract units (e.g., identity styles, life outcomes) at the top of the hierarchy (Cohen, 2000; Milyavskaya et al., 2013). Such a model entails that lower-level representations are *fully* subsumed under higher-level representations (e.g., Markus, 1977; Vallerand, 1997). Conversely, in heterarchical models, each level remains partly independent one from another, and each is only partially subsumed under each other. As such, each level can uniquely contribute to build all upper levels, not just the one immediately superior to it. Our results underscore the role of the episodic level of experience in structuring identity processing styles and life outcomes (i.e., domain satisfaction), over and above their association to identity processing styles. As such, our study adds support to an heterarchical model of the role of episodic memories in personality. Indeed, need satisfaction in memories was associated with informational identity processing styles as well as with satisfaction, over and above the positive association between informational identity processing style and satisfaction. These results echo those of Milyavskaya and colleagues (2013) who provided evidence for an heterarchical organisation of need satisfaction at the episodic, domain and general level and its impact on well-being.

## Limitations

Some of our study limitations ought to be underscored. Our cross-sectional data are inconclusive with regard to the directionality (or bidirectionality) of the relation between memory characteristics and identity processing styles. Experimental and longitudinal studies should be conducted to assess whether self-defining memories have a direct effect on identity processing styles or to investigate the extent of each reciprocal effect. Also, the use of self-report methodologies to assess identity processing styles, satisfaction, need satisfaction and need for cognitive closure in memories might have increased the associations among the variables, due to shared method variance. Finally, our sample has low ecological validity in that it is mostly composed of undergraduate and graduate students, and includes mostly females. Future research should be conducted using a sample more representative of the

general population. In addition, different results could be expected with middle-aged and older adults. Perhaps that self-defining memories have a weaker relationship with identity processing styles (which are more stable) passed 30 or 35 years old.

## DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

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