

Motivated Forgetting in Response to Social Identity Threat

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Motivated forgetting is a psychological defense mechanism whereby people cope with threatening and unwanted memories by suppressing them from consciousness. A series of laboratory experiments investigate whether social identity threat can motivate people subsequently to forget identity-linked marketing promotions. To this effect, whereas social identity priming improves memory for identity-linked promotions, priming coupled with social identity threat (i.e., negative identity-related feedback) impairs memory. Importantly, this identity threat effect occurs only among people who identify strongly with their in-group and only for explicit memory. Implicit memory, in contrast, remains intact under threat. Additionally, the identity threat effect is eliminated (i.e., explicit memory is restored) if people affirm the threatened social identity, thereby mitigating the threat, prior to memory retrieval. Finally, the identity threat effect occurs only when automatic processes guide forgetting. When forgetting is guided by deliberate and controlled processes, the to-be-forgotten memories intrude into consciousness.

In 1915, Sigmund Freud intrigued the world with a theory of repression, which suggests that people protect themselves against the psychological threat posed by traumatic events by burying memory for such events deep in the mind, where the memories lie dormant for weeks, years, or even a lifetime. Despite its intriguing qualities, Freud's theory has faced numerous empirical challenges. Some research finds that so-called repressed memories often are false memories, reconstructed at the time of retrieval (Loftus 1993). Other work casts doubt on the ability to forget unwanted memories, suggesting instead that people are hypersensitive to the very thoughts they wish to suppress (Martin and Tesser 1996; Weg-

ner 1994) and tend to remember negative material better than neutral material (Kensinger 2007). Yet another challenge is evidence that people forget because they avoid encoding threatening material, not because they avoid retrieving it, as Freud's theory claimed (Sedikides, Green, and Pinter 2004). Given these and other challenges, the theory of repression, or motivated forgetting, remains controversial and awaits an empirically falsifiable framework to explain it.

We draw on research on social identity and psychological threat-based coping to develop a framework that predicts when motivated forgetting occurs, which memories are forgotten, and who is motivated to forget. The framework links motivated forgetting to social identity threat, feelings of threat that arise when people encounter negative feedback about an in-group (e.g., their gender, age, nationality, or ethnicity). People cope with social identity threat by suppressing material that they associate to the threat. This can include material that is not inherently threatening, like social identity-linked promotions. This response depends on one's sense of connection to the threatened social identity, with strong identifiers feeling the greatest threat and, in turn, exhibiting the most forgetting. Motivated forgetting does not imply true loss of unwanted material from memory; the material simply is not explicitly retrieved as a defensive response to threat. Accordingly, it remains implicitly accessible in the face of threat and can be explicitly retrieved if the threat is mitigated (e.g., by affirming the threatened social identity). Importantly, because the material remains accessible, it may be accidentally retrieved if people delib-

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erately attempt to suppress it (Jacoby 1991). For this reason, deliberate attempts to forget unwanted memories often fail. For these memories to be forgotten, the processes that guide forgetting must operate with minimal conscious intention and control. To this effect, our framework suggests that motivated forgetting is more effective when it operates automatically than when it operates deliberately.

CONCEPTUAL DEVELOPMENT

Social identity threat occurs when people encounter feedback (e.g., an event, information, or social response) that is negative, that pertains to traits deemed important, and that refers to an in-group rather than an out-group. People develop mechanisms to avoid or protect against sources of threat in an effort to create and maintain a positive view of themselves and social groups to which they belong (Steele 1988; Tajfel and Turner 1986). Memory can protect against threat in at least three ways. First is *biased retrieval* of positive feedback. People remember positive over negative feedback (Skowronski et al. 1991) and misremember negative feedback in positive ways (Markus and Wurf 1987). Biased retrieval is apparent in the way people revise personal histories and selectively recollect events from the past (Ross et al. 1983). Second is *neglected encoding* of threatening feedback. People dissociate from threatening experiences, such as personally traumatic events (Terr 1991; Williams 1994), resulting in shallow processing, less long-term elaboration, fewer retrieval routes, and, in turn, reduced memory (Sedikides et al. 2004). Third is *neglected retrieval* of threatening feedback, Freud's (1915/2001) notion of repression, which is also called motivated forgetting, suppression, and denial, among other titles. Content is encoded normally but later targeted by processes that block it from entering consciousness. Whereas biased retrieval and neglected encoding are widely accepted phenomena, motivated forgetting is questioned on several grounds.

One challenge for motivated forgetting is research on thought suppression and directed forgetting, which yields mixed support for the ability to forget unwanted memories. In support of this ability, some work finds that people can deliberately recruit executive control processes to prevent unwanted material from entering consciousness (Anderson and Green 2001). Other work, in contrast, finds that negative thoughts are ruminated, meaning they repeatedly enter consciousness without environmental cueing (Martin and Tesser 1996) and that even neutral thoughts (e.g., thoughts of white bears) can persist despite direct attempts to suppress them (Wegner 1994). Mixed support also comes from clinical work on repressive coping, which uses directed forgetting tasks to study how personality and life history affect the ability to forget negative material. Some work finds that people with a repressive coping style are more skilled at forgetting negative emotional words presented in word lists relative to nonrepressors (Myers, Brewin, and Power 1998). However, trauma victims—who also are motivated to repress negative content—experience difficulty forgetting trauma-related words compared to neutral words, and trauma victims with a history of repression are no better at forgetting trauma-

related words than are nonvictims or victims who never repressed trauma (Geraerts and McNally 2008). Thus, it remains unclear whether and to what extent people can successfully forget unwanted memories—even people who are highly motivated to do so.

In cases where unwanted memories are successfully forgotten, often it is unclear that motivated forgetting is the cause. In fact, perhaps the greatest challenge for motivated forgetting lies in isolating it. A stringent test would ensure that the to-be-forgotten content is adequately encoded, but this is difficult to achieve because most content that people are motivated to forget is threatening content they neglect to encode in the first place (Sedikides et al. 2004). Consider an advertisement for breast cancer prevention. If the ad makes salient women's vulnerability to the disease, women feel threatened and exhibit defensive responses, such as decreased ad memory (Puntoni, Sweldens, and Tavassoli 2011). But because women feel threatened while encoding the ad, poor memory may be due to neglected encoding, neglected retrieval, or both. In comparison, consider situations where an intervening event makes neutral or positive memories painful to confront. The death of a loved one, for example, makes retrieving fond memories of that person upsetting. Situations like these may be useful for testing motivated forgetting because the to-be-forgotten content is encoded prior to the threat yet, because it reminds people of the threat, retrieving it is threatening in its own right. A similar situation can be created using a social identity threat paradigm. Neutral identity-linked material that is followed by social identity threat should become a potentially powerful reminder cue for the threat (Anderson and Green 2001). Thus, one way to test for motivated forgetting is to present relatively neutral social identity-linked material and facilitate its encoding and then introduce social identity threat to motivate its forgetting.

We apply this rationale to examine motivated forgetting of identity-linked promotions—marketing promotions that target consumers based on a social identity. Identity-linking occurs, for example, when firms strategically use a particular gender or race as spokespersons or actors in ads or offer sales promotions like “10% discount for senior citizens” or “Ladies receive 1 free drink.” We use identity-linked sales promotions (see app. A). Because these promotions are personally relevant and offer financial benefits, target consumers should be inclined to pay attention to and encode them. Also to facilitate attention and encoding, we activate, or prime, the relevant social identity before presenting the promotions. Identity priming is based on the theory that identities have mental representations and temporary increases in the accessibility of an identity representation can make in-group members more responsive to identity-linked content (Markus 1977; Oyserman 2009). In summary, we use identity priming and identity-linked sales promotions to ensure successful encoding. Then we introduce social identity threat only after the promotions are encoded to ensure that any effect of threat on memory can be attributed to retrieval-based rather than encoding-based processes. If the motivated forgetting account is correct in its assertion that people selectively fail to retrieve

threat-provoking memories, then people will forget the identity-linked promotions.

Identification Strength and Motivated Forgetting

This basic argument must be qualified, as not all members of a social group should be equally threatened by negative feedback about that group or equally motivated to protect the in-group image. Rather, we expect motivated forgetting in response to social identity threat to depend on *identification strength*. Identification strength measures the extent to which an in-group member defines the self as such. To the extent that a person holds this self-definition, she/he considers group membership an integral aspect of identity, feels positive affect toward the in-group, and experiences strong in-group ties (Cameron 2004). Although people generally favor in-groups over out-groups, strong identifiers have a greater stake in maintaining a positive image of the in-group (Rothgerber 1997) and tend to exhibit behaviors that portray the in-group in a positive light (Castano et al. 2002). Not surprisingly, identification strength affects how people react to social identity threat. Threatening an in-group's value elicits either an associative response, which affirms the group's value, and in turn self-worth, or a dissociative response, which protects self-worth directly (Knowles and Gardner 2008). Whereas weak identifiers show dissociative responses to threat, strong identifiers show associative responses (Correll and Park 2005; Tajfel and Turner 1986; White and Argo 2009). For example, strong identifiers mobilize effort and resources to defend the in-group image against threat (Spears, Doosje, and Ellemers 1997). They also resolve threat in ways that preserve their positive in-group image (Hutchinson et al. 2006). One way to preserve a positive image of an in-group, according to our theorizing, is to forget memories that threaten that image. Indeed, a similar mechanism protects attitudes. People process and recollect material in ways that protect their strong attitudes against counterattitudinal threat, even if this means forgetting certain attitude-relevant content (Chen and Chaiken 1999). Drawing on these findings, we predict that motivated forgetting increases with identification strength.

Specifically, because weak identifiers do not typically feel threatened by negative feedback about the in-group, they should not be motivated to protect the in-group image and thus should not exhibit motivated forgetting. In fact, weak identifiers' memory for identity-linked promotions may improve under threat because, generally speaking, people recollect negative material better than neutral material (Kensinger 2007). Thus, our theory of motivated forgetting pertains to strong identifiers. Strong identifiers are threatened by negative feedback and tend to respond to it with associative responses that protect their image of the in-group. It follows that strong identifiers should exhibit motivated forgetting.

Recovering Forgotten Memories

Implicit Memory. When people engage in motivated forgetting, what becomes of the forgotten content? In the long

term, memories can decay and be permanently lost (Loftus and Davis 2006). In the short-term, motivated forgetting suggests that memories can be recovered. This account attributes forgetting to suppression, a process that targets threat-related content selectively and undermines its deliberate retrieval. Suppression causes poor explicit memory but does not imply unlearning or true memory loss. Content that is blocked from conscious awareness may remain accessible and reveal itself on implicit measures (Fujiwara, Levine, and Anderson 2008). Whereas explicit memory uses deliberate, controlled processes, implicit memory is apparent when task performance is affected by prior exposure to task-related content (Tulving 1987). If forgetting in the present research is due to retrieval failure rather than memory loss, then we can expect dissociation between explicit and implicit measures. Social identity threat should impair explicit memory but leave implicit memory intact.

If threat-provoking memories do remain implicitly accessible, this might explain why, despite people's best efforts, these memories often cannot be forgotten. As mentioned earlier, a good deal of evidence against motivated forgetting comes from studies that use thought suppression or directed forgetting tasks, in which people who try to forget material may instead retrieve it (Geraerts and McNally 2008; Martin and Tesser 1996). Importantly, this sort of retrieval is accidental. Accidental retrieval is best classified as an incidental use of memory based on prior exposure, or familiarity; it does not result from a deliberate retrieval strategy nor does it imply that a memory can be deliberately retrieved (Jacoby 1991). Therefore, unlike a more automatic form of motivated forgetting, in which the processes that repress memories operate with minimal conscious guidance, a deliberate motivation to forget can backfire because deliberate suppression causes implicitly accessible content to be retrieved accidentally (Newman, Duff, and Baumeister 1997; Wegner 1994). Interestingly, Freud (1915/2001) anticipated accidental retrieval when he described "the return of the repressed," but Freud theorized that accidental retrieval would be avoided if people could invest constant effort into repression. We conjecture, in comparison, that because memories can enter conscious awareness based on familiarity, then even memories that people try diligently to forget can intrude into conscious thought. In sum, if threat-provoking memories do remain implicitly accessible, then we can expect these memories to be accidentally retrieved when people intentionally try to suppress them. In contrast, we expect these memories to be forgotten when suppression operates without conscious intention.

Social Identity Affirmation. Another implication of motivated forgetting is that explicit memory can be restored by social identity affirmation. Motivated forgetting attributes poor explicit memory to a motive to protect against threat. If the protection motive subsides and people become willing to confront threat-related content, memory for that content should improve. According to affirmation theory (Steele 1988), affirming valued aspects of oneself or social groups fulfills the basic motive to protect the integrity of the self

and buffers the impact of threat. Self-identity threat (e.g., a personal failure) is mitigated by affirming aspects of self-identity, such as personal traits (Koole et al. 1999) or values (Steele, Spencer, and Lynch 1993). Likewise, social identity threat is mitigated by affirming values shared by an in-group (White, Argo and Sengupta 2012). Importantly, such affirmations empower people to confront sources of threat that they otherwise would avoid (Sherman and Cohen 2006). Thus, by diffusing the protection motive and enabling people to confront threat-provoking memories, social identity affirmation should restore memory for identity-linked promotions.

STUDY OVERVIEW

Our motivated forgetting framework proposes that even relatively neutral content can be forgotten if the content is linked to social identity threat and people are motivated to protect against such threat (i.e., they identify strongly with the relevant social identity). We test this theorizing in the context of memory for identity-linked sales promotions. Study 1 aims to establish the basic motivated forgetting effect, which is predicted to occur following social identity threat, as a function of identification strength, and only for promotions that are linked to the threatened identity. Study 2 examines whether identity-linked promotions are truly lost following threat or whether memory can be detected on implicit measures. Study 3 tests the prediction that motivated forgetting is successful when it operates with minimal conscious intervention but that it becomes ineffective when people deliberately attempt to control it. Finally, study 4 introduces an identity affirmation task to determine whether mitigating social identity threat restores memory for identity-linked promotions.

EXPERIMENT 1: MOTIVATED FORGETTING

Study 1 tests whether the tendency to forget identity-linked promotions following social identity threat depends on identification strength. The study design included three conditions. In an identity threat condition, we primed a social identity, presented identity-linked promotions, introduced social identity threat, and then tested memory for the promotions. This method is based on the rationale that identity priming facilitates encoding and would otherwise improve memory for identity-linked content but that social identity threat reverses this effect. In an identity prime condition, we excluded the threat to show that identity priming alone improves memory for identity-linked promotions. Finally, in a control condition, we excluded both the prime and the threat to establish baseline memory. We tested recognition memory because this provides a more conservative test of our theory than recall (though we found similar effects on recognition and recall in a pretest that measured both).

We formulated predictions for the slope of the effect of identification strength in each condition. Prior research finds that individual difference factors must be salient to affect

consumer responses (Aaker 1999) and that, in particular, social identity must be salient to affect memory (Yang, Liao, and Huang 2008). Accordingly, identification strength should positively affect memory in the identity prime condition (when the social identity is salient) but not in the control condition (when the social identity is not salient). In the identity threat condition, because the motive to forget should depend on identification strength, identification strength should negatively affect memory. In addition to these slope predictions, our theorizing also implies that strong (and not weak) identifiers should forget more identity-linked promotions in the identity threat condition compared to the other conditions. In sum, we hypothesized:

- H1:** The effect of identification strength on recognition memory for identity-linked promotions is positive in an identity prime condition, negative in an identity threat condition, and nonsignificant in a control condition. Among strong identifiers, recognition is reduced in the identity threat condition versus either other condition.

Before describing the main study, we present the results of two pretests. First, we tested a social identity priming manipulation, and then we tested a social identity threat manipulation.

Pretest 1: Social Identity Priming Manipulation

We tested a comparative distinctiveness manipulation to use as a social identity prime. Comparative distinctiveness occurs when an object has a property that differentiates it from most or all others around it. This draws attention selectively to the object, making it salient in its immediate context. Thus, if a person possesses a trait that is distinctive in a social context, that trait becomes more accessible than it otherwise would be and more accessible than more common traits (McGuire et al. 1978; Wooten 1995). Imagine, for example, a woman entering a bar where the patrons include few women among many men. Her gender is distinctive and therefore more accessible in memory. Because our participant population is composed of university students, we use comparative distinctiveness to prime a university student identity.

We measured the effect of comparative distinctiveness on identity accessibility using McGuire et al.'s (1978) spontaneous self-description task, in which respondents describe personal characteristics in an open-ended format. We chose this task because it does not ask about identity explicitly and therefore does not impose demand or contaminate psychological processes. Also, prior research has found that a comparatively distinct social identity is more likely to be spontaneously mentioned than a nondistinct one (Forehand, Deshpandé, and Reed 2002). We tested the prediction that students assigned to an identity prime condition, where their university identity is comparatively distinct, are more likely to mention their university affiliation in a spontaneous self-description task compared to students assigned to a control

condition, where their university identity is not comparatively distinct.

Participants and Procedure. Two hundred undergraduates attending the City University of Hong Kong participated in exchange for monetary payment. Seven were excluded for missing data or failure to follow instructions, leaving 193 for analysis. We randomly assigned participants to an identity prime or control condition. The instructions and tasks were computer-based. According to the cover story, we were studying how media and marketing affect people in Hong Kong. Participants in the identity prime condition read that 50 students from their university and 150 students from another local university would be surveyed. Those in the control condition read that 150 students from each university would be surveyed. Next, participants completed the spontaneous self-description task, which consists of a single open-ended question: "Please tell us about yourself in your own words. Please take about a minute to do so."

In addition to testing the main effect of identity priming on identity accessibility, we wanted to test if identification strength moderates this effect. Thus, after the spontaneous self-description task, participants completed a survey ostensibly related to the university's upcoming anniversary. It included demographic questions and the strength of identification (SOI) scale, adapted for a university student identity ($\alpha = .77$; Cameron 2004). The SOI scale presented 12 items, each on a 7-point scale anchored by *strongly disagree* and *strongly agree*. Items included "Being a student of (this university) is an important part of my self-image"; "Generally, I feel good about myself when I think about being a student of (this university)"; and "I have a lot in common with other students of (this university)."

Results and Discussion. First, we conducted a one-way ANOVA to ensure that identity condition did not affect responses to the SOI scale. We found a nonsignificant effect here and in subsequent studies ($p > .19$; pretest 2: $p > .92$; study 1: $p > .24$; study 2: identification condition, $p > .78$; familiarity condition, $p > .95$; study 3: $p > .77$; study 4: $p > .23$).

Next, we tested the effect of identity condition on identity accessibility. Two assistants, blind to the hypotheses and conditions, coded whether or not university affiliation was mentioned explicitly in the spontaneous self-description task. The coders reached 96% agreement initially and resolved discrepancies through discussion. We regressed the binary identity accessibility measure on identity condition and found that university affiliation was mentioned by more students in the identity prime condition (83%) than the control condition (18%, $\chi^2(1) = 66.63, p < .001$). To test if SOI moderated this effect, we ran another binary logistic regression, this time including SOI (mean-centered here and in all analyses reported in this article), identity condition, and their interaction. The interaction was nonsignificant ($p > .46$). The slope of the SOI effect in the identity prime condition also was nonsignificant ($p > .69$). These results suggest that identity

priming increased identity accessibility and that this effect did not depend on SOI (also see Forehand and Deshpandé 2001; Forehand et al. 2002). (Note that the spontaneous self-description task was administered as a manipulation check in studies 1, 2, and 3 and that similar results were obtained. Details are available upon request.)

Pretest 2: Social Identity Threat Manipulation

Participants and Procedure. Fifty-three undergraduates attending the Hong Kong University of Science and Technology (HKUST) underwent the social identity prime described in pretest 1. Next, they read a news article that described recent research on local universities. The news was fictitious and was crafted to be either neutral or threatening (adopted from White et al. 2012). Participants in the identity prime condition read neutral news, which claimed that their university is performing on par with local universities in terms of quality of students, instruction, and community contribution. Those in the identity threat condition read negative news, which stated that their university is underperforming on these dimensions. Participants then indicated how the news made them feel. They responded to six items (i.e., *unhappy, threatened, attacked, maligned, challenged, and impugned*) on 7-point scales, from *not at all* to *very much*. Ratings were summed to measure feelings of threat ($\alpha = .95$). Participants then completed the supposedly unrelated demographic questions and the SOI scale ($\alpha = .78$; Cameron 2004).

Results and Discussion. We regressed feelings of threat on SOI, identity condition, and their interaction, and we found significant effects for identity condition ($B = .81, t(49) = 2.30, p < .03$) and the interaction ($B = .09, t(49) = 2.07, p < .05$). We decomposed the interaction to test the slope of the SOI effect in each identity condition. The slope was positive in the identity threat condition ($B = .11, t(49) = 3.32, p < .01$) but nonsignificant in the identity prime condition ($p > .60$). Next, we decomposed the interaction using spotlight analyses (Aiken and West 1991; Fitzsimons 2008) to separately examine strong and weak identifiers. We found that feelings of threat were higher in the identity threat condition compared to the identity prime condition at one standard deviation above the mean SOI level ($B = 1.54, t(49) = 3.09, p < .01$) but that they were no different at one standard deviation below the mean SOI level ($p > .88$), suggesting that the threat manipulation affected strong but not weak identifiers. These results collectively show that feelings of threat increase as a function of SOI (also see Correll and Park 2005; Steele 1988). It follows that the motivation to forget also should increase as a function of SOI.

All subsequent studies use these pretested cover stories and methods. Specifically, the comparative distinctiveness manipulation primes (or not) participant's university student identity; the negative news article induces threat, and the neutral news article is a filler task; and Cameron's (2004)

SOI scale measures individual differences in identification strength.

Study 1: Participants and Design

In the main study, 285 undergraduates participated in exchange for monetary payment. Four were excluded for missing data or failure to follow instructions, leaving 281 for analysis. Data were collected at two universities, HKUST and Shenzhen University, located in the neighboring city Shenzhen (using a cover story and SOI scale tailored to Shenzhen). University affiliation did not affect the results, so we collapse across this factor. For simplicity and because all subsequent studies were conducted at HKUST, the procedures describe only the materials used at HKUST. The design was a 3 (identity condition: identity prime, identity threat, or control) \times SOI, with identity condition manipulated and SOI measured between subjects.

Procedure

Participants were randomly assigned to an identity prime, identity threat, or control condition. Those in the identity prime and identity threat conditions underwent identity priming, reading that 50 students from their university and 150 students from another local university would be surveyed. Those in the control condition read that 150 students from each university would be surveyed. To bolster the cover story that the research pertains to “media and marketing,” participants viewed a TV commercial (unrelated to student identity) and rated how much they liked it. Next, they viewed 20 print ads for major retailers and were told that they would be questioned about the ads later. Each ad appeared for 3 seconds. We added identity-linked promotions to eight ads by stating, “Additional 10% discount for HKUST students” (see app. A). After viewing the ads, participants in the identity prime and control conditions read neutral news about their university, while those in the identity threat condition read negative news. Next, everyone completed a self-paced recognition memory test. It presented the 20 old (previously viewed) ads and 20 new (previously unseen) ads. Eight of each featured an identity-linked promotion. The ads appeared on a single web page in an order that was randomly determined then fixed across participants. We asked participants to select every ad that they had seen earlier. As an incentive, we offered prizes for accurate memory. Correctly selecting an old ad is called a *hit*. Incorrectly selecting a new ad is called a *false alarm*. Our key dependent measure is *corrected hits*, the number of hits minus the number of false alarms, which corrects for individual differences in the tendency to label items “old” (Mulligan, Besken, and Peterson 2010). After the memory test, participants completed the ostensibly unrelated demographic questions and the SOI scale ($\alpha = .82$; Cameron 2004). We ended sessions with a funneled debriefing questionnaire (Bargh and Chartrand 2000) to assess whether participants were suspicious of the cover story, could guess the true purpose of the tasks, or verbalized a motive or tendency

to forget. No evidence for these effects was obtained here or in subsequent studies. We address this result in the general discussion section.

Results

We analyzed corrected hits for identity-linked promotions in a linear regression. Because identity condition has three levels, the regression included the variables SOI, identity prime (dummy coded as identity prime condition = 1 and control = 0), identity threat (dummy coded as identity threat condition = 1 and control = 0), SOI \times identity prime, and SOI \times identity threat. We found significant effects of SOI \times identity prime ($B = .12$, $t(275) = 2.93$, $p < .01$) and SOI \times identity threat ($B = -.13$, $t(275) = -3.29$, $p < .01$). See figure 1. See table 1 for results for uncorrected hits and false alarms for identity-linked promotions and for hits, false alarms, and corrected hits for identity-neutral promotions.

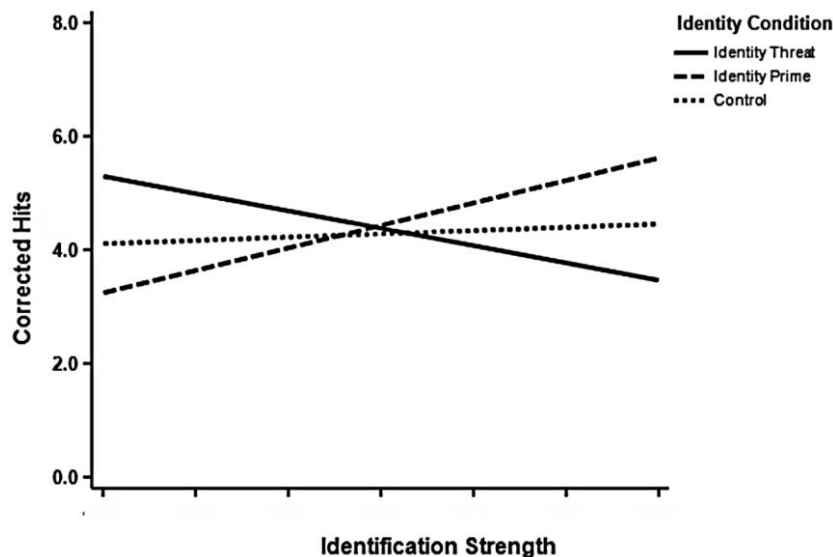
Next, we tested the slope of the SOI effect in each identity condition. The slope was positive in the identity prime condition ($B = .14$, $t(275) = 4.87$, $p < .001$), negative in the identity threat condition ($B = -.10$, $t(275) = -4.02$, $p < .001$), and nonsignificant in the control condition ($p > .45$). Finally, we examined memory among strong identifiers. A spotlight analysis comparing the identity conditions at one standard deviation above the mean SOI level found that corrected hits were lower in the identity threat condition compared to either the identity prime condition ($B = -2.22$, $t(275) = -4.84$, $p < .001$) or the control condition ($B = -1.01$, $t(275) = -2.05$, $p < .05$). Although we did not formulate predictions for weak identifiers, we observed a reversal of this pattern at one standard deviation below the mean SOI level, such that corrected hits were highest in the identity threat condition. See table 2 for the complete spotlight results.

Discussion

Supporting hypothesis 1, study 1 found that identification strength exerts a positive effect on memory for identity-linked promotions if the relevant identity is primed, a negative effect if the primed identity is threatened, and no effect if the identity is neither primed nor threatened. Moreover, strong identifiers forgot more identity-linked promotions in the identity threat condition compared to the other conditions. These results have several implications. First, because the identity prime and identity threat conditions were identical at encoding, we rule out the possibility that forgetting is due to processes operating at encoding, like enhanced attention or greater elaboration during encoding. Instead the results are consistent with motivated forgetting, which attributes forgetting to processes operating at retrieval. Second, because we found effects on memory for identity-linked and not identity-neutral promotions, we rule out the possibility that threat impairs memory by causing cognitive load or distraction, which would affect retrieval uniformly. Instead, and consistent with motivated forgetting, threat

FIGURE 1

STUDY 1: CORRECTED HITS AS A FUNCTION OF IDENTITY CONDITION AND IDENTIFICATION STRENGTH



NOTE.—The values of identification strength represented on the X-axis range from -1 SD below the mean (46.5) to $+1$ SD above the mean (63.9), with the mean (55.2) at the midpoint.

TABLE 1

STUDY 1: EFFECTS ON RECOGNITION MEMORY

Effect	Hits	False alarms	Corrected hits
Identity-linked promotions:			
Identification strength (SOI)	$B = .02, t = .70, p > .48$	$B = -.004, t = -.38, p > .70$	$B = .02, t = .75, p > .45$
Identity prime	$B = -.001, t = -.003, p > .99$	$B = -.16, t = -1.21, p > .22$	$B = .16, t = .44, p > .66$
Identity threat	$B = .05, t = .17, p > .86$	$B = -.04, t = -.34, p > .73$	$B = .09, t = .27, p > .78$
SOI \times identity prime	$B = .10, t = 2.97, p < .01$	$B = -.01, t = -.95, p > .34$	$B = .12, t = 2.93, p < .01$
SOI \times identity threat	$B = -.10, t = -2.95, p < .01$	$B = .03, t = 1.99, p < .05$	$B = -.13, t = -3.29, p < .01$
Identity-neutral promotions:			
Identification strength (SOI)	$B = .01, t = .17, p > .86$	$B = .01, t = .84, p > .40$	$B = -.01, t = -.10, p > .91$
Identity prime	$B = 1.02, t = 1.90, p < .06$	$B = -.27, t = -1.52, p > .12$	$B = 1.29, t = 2.16, p < .04$
Identity threat	$B = .62, t = 1.21, p > .22$	$B = -.17, t = -.98, p > .32$	$B = .79, t = 1.38, p > .16$
SOI \times identity prime	$B = .04, t = .62, p > .53$	$B = -.02, t = -1.02, p > .30$	$B = .06, t = .86, p > .39$
SOI \times identity threat	$B = -.07, t = -1.26, p > .21$	$B = .02, t = 1.08, p > .28$	$B = -.09, t = -1.46, p > .14$

NOTE.—Hits = the percentage of old promotions correctly identified as old; false alarms = the percentage of new promotions incorrectly identified as old; corrected hits = hits $-$ false alarms.

caused selective forgetting of some memories and not others. Finally, the fact that forgetting was greatest among strong identifiers, who are inclined to protect the in-group image, supports the argument that forgetting reflects a protective response to threat.

Interestingly, these effects reversed among weak identifiers, with threat improving rather than impairing their memory. Because weak identifiers are not threatened by the negative news article (see pretest 2), the effect is outside the scope of motivated forgetting. However, it is consistent with a large literature showing better memory for

emotional material, negative or positive, over neutral material (Christianson 1992; Ochsner 2000). For instance, pictures of negative stimuli, like snakes and army tanks, are remembered better than pictures of neutral stimuli, like birds and teapots (Kensinger 2007). It is reasonable to assume that weak identifiers in the threat condition perceive identity-linked promotions as they would snakes or army tanks—as material that is negative but not ego-threatening. Thus, one may expect weak identifiers' memory to improve under threat. We revisit this issue in the general discussion section.

TABLE 2

STUDIES 1–4: IDENTIFICATION STRENGTH (SOI) SPOTLIGHT ANALYSES FOR IDENTITY-LINKED PROMOTIONS

Study and measure/identity condition	SOI spotlight analysis	
	-1 SD	+1 SD
Study 1: Corrected hits:		
Identity threat vs. identity prime	$B = 2.01, t(275) = 4.22, p < .001$	$B = -2.22, t(275) = -4.84, p < .001$
Identity threat vs. control	$B = 1.19, t(275) = 2.59, p < .02$	$B = -1.01, t(275) = -2.05, p < .05$
Identity prime vs. control	$B = -.86, t(275) = -1.70, p < .10$	$B = 1.17, t(275) = 2.42, p < .02$
Study 2:		
Image response level/identity threat vs. control	$B = -.07, t(141) = -.21, p > .83$	$B = -1.06, t(141) = -3.13, p < .01$
Familiarity ratings/identity threat vs. control	$B = -.18, t(154) = -.68, p > .49$	$B = .81, t(154) = 3.07, p < .01$
Study 3:		
Probability of use in inclusion trials:		
Identity threat vs. identity prime	$B = 1.99, t(162) = 4.54, p < .001$	$B = -2.08, t(162) = -4.91, p < .001$
Identity threat vs. control	$B = .98, t(162) = 1.94, p < .06$	$B = -.98, t(162) = -1.81, p < .08$
Identity prime vs. control	$B = -1.01, t(162) = -1.96, p < .06$	$B = 1.10, t(162) = 2.03, p < .05$
Probability of use in exclusion trials:		
Identity threat vs. identity prime	$B = -.35, t(162) = -.79, p > .43$	$B = -.81, t(162) = -1.92, p < .06$
Identity threat vs. control	$B = .19, t(162) = .37, p > .71$	$B = 1.79, t(162) = 3.32, p < .01$
Identity prime vs. control	$B = .53, t(162) = 1.04, p > .30$	$B = 2.60, t(162) = 4.79, p < .001$
Recollection:		
Identity threat vs. identity prime	$B = .30, t(162) = 4.41, p < .001$	$B = -.51, t(162) = -7.80, p < .001$
Identity threat vs. control	$B = .13, t(162) = 1.70, p < .10$	$B = -.31, t(162) = -3.66, p < .001$
Identity prime vs. control	$B = -.17, t(162) = -2.09, p < .04$	$B = .21, t(162) = 2.45, p < .02$
Familiarity:		
Identity threat vs. identity prime	$B = .05, t(162) = 1.00, p > .31$	$B = -.02, t(162) = -.37, p > .71$
Identity threat vs. control	$B = .07, t(162) = 1.31, p > .19$	$B = .28, t(162) = 4.91, p < .001$
Identity prime vs. control	$B = .02, t(162) = .44, p > .66$	$B = .29, t(162) = 5.17, p < .001$
Study 4: Corrected hits:		
Identity affirmation vs. identity threat	$B = -1.17, t(220) = -1.91, p < .06$	$B = 1.92, t(220) = 3.27, p < .01$
Identity affirmation vs. identity prime	$B = .57, t(220) = .91, p > .36$	$B = .25, t(220) = .42, p > .67$
Identity prime vs. identity threat	$B = -1.74, t(220) = -2.51, p < .02$	$B = 1.67, t(220) = 2.46, p < .02$
Group affirmation vs. identity threat	$B = -.44, t(220) = -.68, p > .49$	$B = .84, t(220) = 1.33, p > .18$
Self-affirmation vs. identity threat	$B = -.79, t(220) = -1.24, p > .21$	$B = .62, t(220) = .79, p > .42$

EXPERIMENT 2: IMPLICIT MEMORY

According to motivated forgetting, material people fail to retrieve explicitly should nevertheless remain available in memory and reveal itself on implicit measures. Study 2 tested this prediction and relied on two different implicit memory measures to ensure the generalizability of the findings. We included the identity threat and control conditions and predicted moderation by identification strength, which led to the following hypothesis:

H2: The effect of identification strength on implicit memory for identity-linked promotions is positive in an identity threat condition but not in a control condition. Among strong identifiers, implicit memory is better in the identity threat condition versus the control condition.

To complement study 1's results, which show that people forget identity-linked material that is tainted by threat, study 2 sought to show that people also avoid the source of threat itself: here, news about their university. We designed a measure based on evidence that people avoid (approach) exposure to material that threatens (supports) strong attitudes (Chen and Chaiken 1999). We reasoned that if students are threatened by reading negative news, they will avoid reading

additional news about the university, as it could exacerbate or prolong their feelings of threat. But if students read neutral news, they have no reason to avoid other news and may even seek it out. Incorporating identification strength, we hypothesized:

H3: The effect of identification strength on interest in identity-related news is negative in the identity threat condition but not in the control condition. Among strong identifiers, interest is reduced in the identity threat condition versus the control condition.

Participants and Design

Two hundred and ninety-nine HKUST undergraduates participated in exchange for course credit. The design was a 2 (identity condition: identity threat vs. control) \times 2 (implicit memory test: image identification vs. image familiarity) \times SOI, with identity condition and implicit memory test manipulated and SOI measured between subjects.

Procedure

The procedure differed from the study 1 procedure in three respects. First, only the identity threat and control conditions were included. Second, after reading negative or neutral news, participants rated their interest to read more news about their university on a 7-point scale, from *not at all interested* to *extremely interested*. Third, participants were randomly assigned to complete one of two implicit memory tests: image identification or image familiarity.

To design the tasks, we created fragmented images of the 40 ads used in study 1's recognition test (i.e., the eight old and the eight new ads featuring identity-linked promotions and the 12 old and 12 new ads featuring identity-neutral promotions). Each image was created using an algorithm that randomly and cumulatively covered it with dots to give it a fuzzy appearance (adopted from Snodgrass et al. 1987). We made 10 images of each ad, ranging from 90% to 0% dot coverage (see app. B). For the image identification task, the 10 images of each ad appeared sequentially, for 3 seconds each, from most to least fragmented (giving an appearance of dots clearing), until participants pressed a key to indicate that they could identify the ad. If they failed to respond before the tenth image appeared, the screen automatically advanced to the next ad's set of images. Participants saw images for all 40 ads. The dependent measure is mean *response level*, from 1 to 9. Lower levels represent responses to more fragmented images and, therefore, reflect better implicit memory.

For the image familiarity task, one image of each of the 40 ads was presented at 60% dot coverage (see app. B). We chose 60% because pretesting suggested that most people could not consciously recognize ads at this level (also see Landrum 1997). Participants rated each image's familiarity on a 7-point scale, from *not at all familiar* to *very familiar*. If they failed to respond within 3 seconds, the screen automatically advanced to the next image (adopted from Pilotti et al. 2000). The dependent measure is mean *familiarity rating*, from 1 to 7. Higher familiarity ratings reflect better implicit memory.

Both tasks were referred to as "fuzzy picture games." We asked participants to respond as quickly as possible, relying on their instincts and feelings. Requiring fast responses increases the odds that responses rely on automatic, not controlled, processes (Yonelinas and Jacoby 2012). As in study 1, it is possible to analyze "corrected" measures (i.e., responses to old minus new ads). However, participants failed to respond to new ads on 18% of trials in the image identification task and 35% of trials in the image familiarity task (possibly because the new ads were completely unfamiliar and participants were unsure how to respond to them). Because so much data for new ads are missing, we present results for the uncorrected measures (i.e., responses to old ads). Following the implicit memory test, participants completed the demographic questions, the SOI scale ($\alpha = .80$), and a funneled debriefing.

Results

Interest in University News. We regressed interest in news on SOI, identity condition, and their interaction. The interaction was significant ($B = -.10$, $t(296) = -4.19$, $p < .001$). The slope of the SOI effect was negative in the identity threat condition ($B = -.06$, $t(296) = -4.01$, $p < .001$) and positive in the control condition ($B = .05$, $t(296) = 2.29$, $p < .03$). The spotlight analysis found that strong identifiers' interest in news was lower in the identity threat condition compared to the control condition ($B = -.84$, $t(296) = -2.73$, $p < .01$).

Image Response Level. We regressed response level for old identity-linked promotions on SOI, identity condition, and their interaction. The interaction was significant ($B = -.05$, $t(141) = -2.08$, $p < .04$). See figure 2. The slope of the SOI effect was negative in the identity threat condition ($B = -.06$, $t(141) = -3.22$, $p < .01$) but nonsignificant in the control condition ($p > .89$). A spotlight analysis found that strong identifiers' response levels were lower in the identity threat condition than the control condition ($B = -1.06$, $t(141) = -3.13$, $p < .01$). See table 2 for complete spotlight results. We found no significant effects on responses to new identity-linked promotions, corrected responses to identity-linked promotions, or responses to identity-neutral promotions (old, new, or corrected). It is worth noting that the SOI \times identity condition effect on corrected responses to identity-linked promotions, though nonsignificant ($p > .16$), did show the same pattern as that obtained for the uncorrected responses (i.e., the pattern depicted in fig. 2).

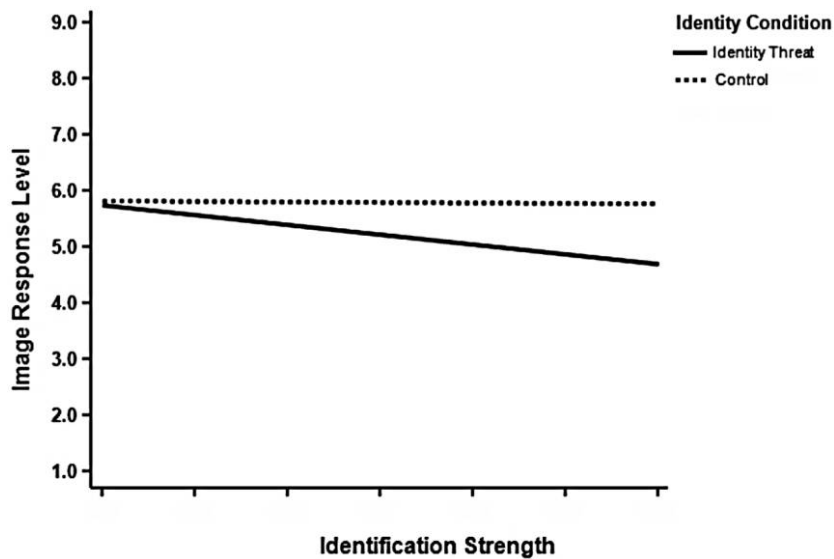
Image Familiarity Ratings. We regressed familiarity ratings for old identity-linked promotions on SOI, identity condition, and their interaction. The interaction was significant ($B = .05$, $t(154) = 2.52$, $p < .02$). See figure 3. The slope of the SOI effect was positive in the identity threat condition ($B = .05$, $t(154) = 5.05$, $p < .001$) but nonsignificant in the control condition ($p > .97$). A spotlight analysis found that strong identifiers' familiarity ratings were higher in the identity threat condition than the control condition ($B = .81$, $t(154) = 3.07$, $p < .01$). See table 2 for the complete spotlight results. We found no significant effects on familiarity ratings for new identity-linked promotions, corrected familiarity ratings for identity-linked promotions, or familiarity ratings for identity-neutral promotions (old, new, or corrected). The SOI \times identity condition effect on corrected familiarity ratings for identity-linked promotions, though nonsignificant ($p < .08$), did show the same pattern as that obtained for the uncorrected familiarity ratings (i.e., the pattern depicted in fig. 3).

Discussion

Supporting hypothesis 3, study 2 shows that identification strength negatively affects interest to read news about the university in the social identity threat condition but not in the control condition and that interest among strong iden-

FIGURE 2

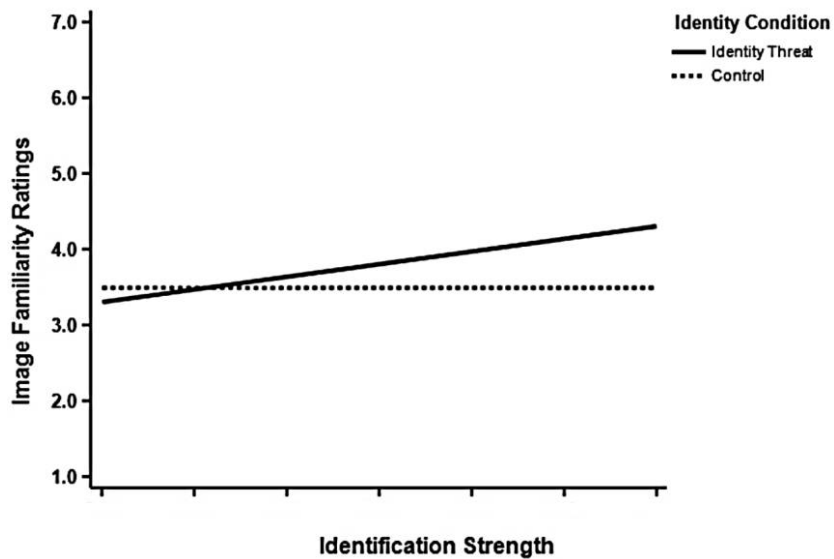
STUDY 2: IMAGE RESPONSE LEVEL AS A FUNCTION OF IDENTITY CONDITION AND IDENTIFICATION STRENGTH



NOTE.—The values of identification strength represented on the X-axis range from -1 SD below the mean (42.4) to $+1$ SD above the mean (61), with the mean (51.7) at the midpoint.

FIGURE 3

STUDY 2: IMAGE FAMILIARITY RATINGS AS A FUNCTION OF IDENTITY CONDITION AND IDENTIFICATION STRENGTH



NOTE.—The values of identification strength represented on the X-axis range from -1 SD below the mean (42) to $+1$ SD above the mean (62.7), with the mean (52.3) at the midpoint.

tifiers is reduced under social identity threat versus no threat. These results support the prediction that people avoid the source of social identity threat—here, by avoiding exposure to news pertinent to the threatened identity. Supporting hypothesis 2, identification strength positively affects implicit memory for identity-linked promotions under social identity threat but not under control conditions, and strong identifiers' implicit memory is better under threat versus no threat. Consistent with motivated forgetting, these results imply that identity-linked promotions are not lost from memory. They remain accessible and can be detected on implicit measures, like image identification and image familiarity.

Thus far, we find that when people try deliberately to recollect threat-related material, retrieval is blocked by suppression processes, resulting in poor explicit memory (in study 1). However, because the material remains accessible in memory, implicit memory for it remains intact (in study 2). In study 3, we consider what happens when people deliberately try to forget, rather than remember, threat-related material.

EXPERIMENT 3: DELIBERATE FORGETTING

In the case of deliberate forgetting, successful forgetting requires controlled processes, but retrieval is accidental and reflects implicit memory (Jacoby 1991). Thus, any material that is implicitly accessible may be accidentally retrieved, including material that is threat related. Accordingly, study 3 tests the argument that threat-related material is forgotten when people try to retrieve it (because deliberate retrieval is impeded by repression processes) but that it is remembered when people try to forget it (because accidental retrieval depends on familiarity, which is unaffected by repression processes). Simply stated, study 3 tests the argument that motivated forgetting becomes less effective when it operates under deliberate control.

The process dissociation task (Jacoby 1991) is ideally suited to test this view. This task includes two types of trials. On *inclusion trials*, people try to use target content (here, identity-linked brands) in their responses. Inclusion trials correspond to a standard explicit memory test and thus should yield results similar to explicit memory in study 1. On *exclusion trials*, participants try to avoid using target content. Exclusion trials test accidental retrieval and thus should produce results similar to implicit memory in study 2. We included prime, identity threat, and control conditions. Incorporating identification strength, we hypothesized:

H4a: On inclusion trials, the effect of identification strength on the probability of using identity-linked brands is positive in an identity prime condition, negative in an identity threat condition, and nonsignificant in a control condition. Among strong identifiers, the probability of using identity-linked brands is reduced in the identity threat condition versus either other condition.

H4b: On exclusion trials, the effect of identification strength on the probability of using identity-linked brands is positive in identity prime and identity threat conditions and nonsignificant in a control condition. Among strong identifiers, the probability of using identity-linked brands is increased in the identity prime and identity threat conditions versus the control condition.

The data collected on inclusion and exclusion trials can be used to calculate process-pure measures of explicit and implicit memory. Pure explicit memory, or *recollection*, is memory based solely on deliberate, controlled processes, whereas pure implicit memory, or *familiarity*, is memory based solely on the automatic effects of prior exposure. Calculating the separate contributions of recollection and familiarity is important because performance on inclusion trials (and other explicit memory tests) does not rely purely on recollection. Both recollection and familiarity contribute to memory performance. Mathematically, on inclusion trials, the probability of using identity-linked brands is $P(\text{responding "old"}|\text{inclusion}) = P(\text{FAM}) + P(\text{REC}) - P(\text{FAM}) \times P(\text{REC})$. At the same time, using an old brand on exclusion trials can only be caused by a combination of failure to recollect and presence of familiarity, such that $P(\text{responding "old"}|\text{exclusion}) = P(\text{FAM}) \times (1 - P(\text{REC})) + P(\text{REC})$. $P(\text{REC})$ can be derived from subtracting the latter term from the first (i.e., $P(\text{responding "old"}|\text{inclusion}) - P(\text{responding "old"}|\text{exclusion}) = P(\text{REC})$), whereas $P(\text{FAM})$ is given as $P(\text{responding "old"}|\text{exclusion}) / (1 - P(\text{REC}))$.

Based on our theorizing, social identity threat activates memory suppression processes that reduce the contribution of recollection. At the same time, familiarity is unaffected by threat. Thus, we hypothesized:

H5: As a function of identification strength, social identity threat reduces the contribution of recollection but not that of familiarity as a basis for responding.

This theorizing implies that recollection and familiarity will resemble performance on inclusion trials (hypothesis 4a) and exclusion trials (hypothesis 4b), respectively. Finally, study 3 included the interest in news measure. We expected support for hypothesis 3, and we further expected the identity prime condition to resemble the control condition.

Participants and Design

One hundred and eighty HKUST undergraduates participated in exchange for monetary payment or course credit. Compensation method did not affect the results, so we collapse across this factor. We excluded four students because of missing data or failure to follow instructions and eight who were visiting the university as exchange students, leaving 168 for analysis. The design was a 3 (identity condition: identity threat, identity prime, or control) \times 2 (trial type:

inclusion vs. exclusion) \times SOI. We manipulated the identity condition, and we measured SOI between subjects and manipulated trial type within subjects.

Procedure

We included identity prime, identity threat, and control conditions, and we measured interest in news after the threat manipulation. The key change was to test memory in a process dissociation task. The task used the 40 fragmented images from study 2's image familiarity task (see app. B). Participants were told that they would see a series of fuzzy images, one at a time. Each image would be preceded by either the word "OLD" or "NEW." When the word "OLD" appeared before an image, they should label the image using any brand name they saw earlier when they were viewing the ads for local retailers. However, when the word "NEW" appeared, they should label the image using a brand that did not appear earlier. Participants typed their responses beneath each image. The words "OLD" and "NEW" designated inclusion and exclusion trials, respectively. Each image appeared once, either in an inclusion or exclusion trial. As described above, our dependent measures are Inclusion (i.e., the probability of using an old brand on inclusion trials), Exclusion (i.e., the probability of using an old brand on exclusion trials), Recollection (i.e., Inclusion - Exclusion), and Familiarity (i.e., Exclusion/(1 - Recollection); Jacoby 1991; Yonelinas and Jacoby 2012). Following the process dissociation task, participants completed demographic questions, the SOI scale ($\alpha = .85$), and the funneled debriefing.

Results

Interest in University News. We analyzed interest in news in a linear regression. Because identity condition has three levels, the regression included the variables SOI, identity prime (dummy coded as identity prime condition = 1 and control = 0), identity threat (dummy coded as identity threat condition = 1 and control = 0), SOI \times identity prime, and SOI \times identity threat. We found significant effects of SOI \times identity prime ($B = .07$, $t(162) = 2.24$, $p < .03$) and SOI \times identity threat ($B = -.06$, $t(162) = -2.09$, $p < .04$). The slope of the SOI effect was negative in the identity threat condition ($B = -.07$, $t(162) = -4.23$, $p < .001$), positive in the identity prime condition ($B = .07$, $t(162) = 3.99$, $p < .001$), and nonsignificant in the control condition ($p > .89$). Spotlight analyses found that strong identifiers' interest in news was lower in the identity threat condition compared to either the identity prime condition ($B = -1.41$, $t(162) = -4.14$, $p < .001$) or the control condition ($B = -.80$, $t(162) = -1.85$, $p < .07$).

Use of Old Brands. We conducted a similar set of regressions to analyze the probability of labeling images using old identity-linked brands. For Inclusion, we found significant effects of SOI \times identity prime ($B = .10$, $t(162) = 2.65$, $p < .01$) and SOI \times identity threat ($B = -.10$, $t(162)$

$= -2.48$, $p < .02$). The slope of the SOI effect was positive in the identity prime condition ($B = .12$, $t(162) = 5.89$, $p < .001$), negative in the identity threat condition ($B = -.08$, $t(162) = -3.81$, $p < .001$), and nonsignificant in the control condition ($p > .56$). Spotlight analyses found that strong identifiers were less likely to use old identity-linked brands in the identity threat condition compared to the identity prime ($B = -2.08$, $t(162) = -4.91$, $p < .001$) or control condition ($B = -.98$, $t(162) = -1.81$, $p < .08$). See table 2 for the complete spotlight results. None of the effects for identity-neutral brands were significant.

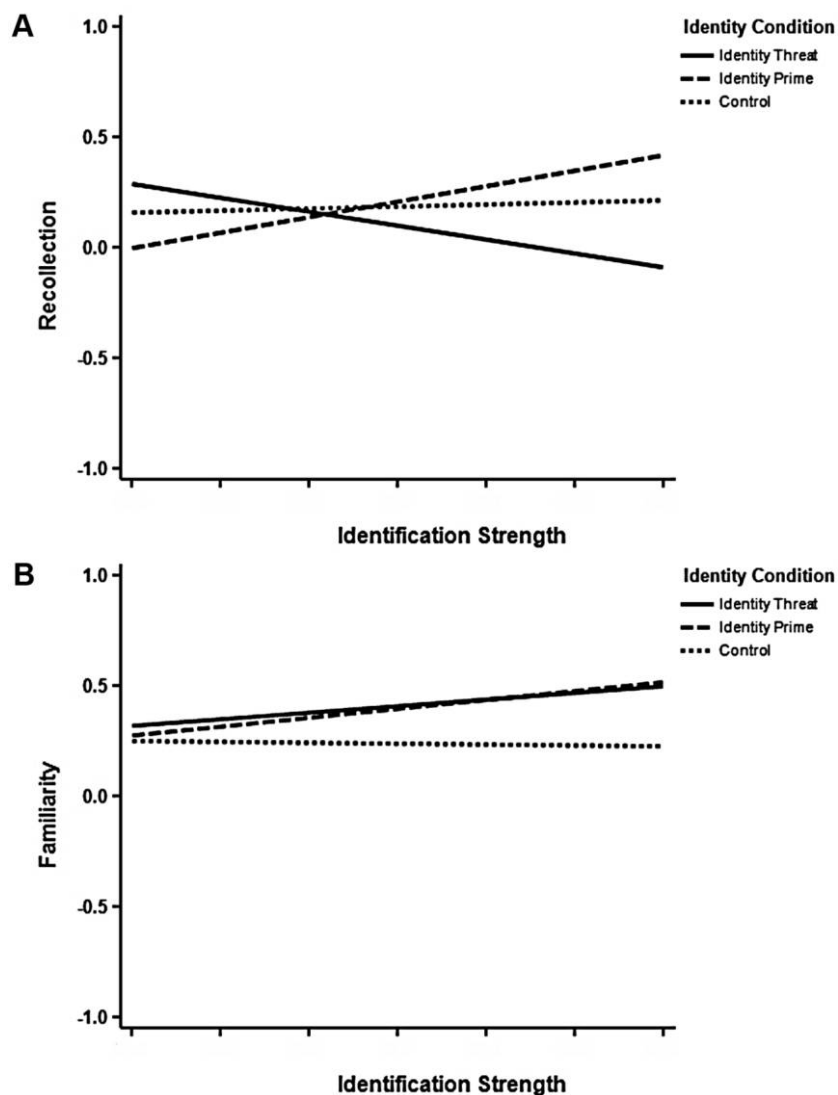
For Exclusion, we found significant effects of SOI \times identity prime ($B = .10$, $t(162) = 2.61$, $p < .02$) and SOI \times identity threat ($B = .08$, $t(162) = 2.04$, $p < .05$). The slope of the SOI effect was positive in the identity prime condition ($B = .10$, $t(162) = 4.74$, $p < .001$), positive in the identity threat condition ($B = .08$, $t(162) = 3.75$, $p < .001$), and nonsignificant in the control condition ($p > .92$). Spotlight analyses found that strong identifiers were more likely to respond with an old identity-linked brand in the identity threat condition compared to the control condition ($B = 1.79$, $t(162) = 3.32$, $p < .01$) and in the identity prime condition compared to the control condition ($B = 2.60$, $t(162) = 4.79$, $p < .001$). See table 2 for the complete spotlight results. None of the effects for identity-neutral brands were significant.

Estimates of Recollection and Familiarity. Similar regressions were conducted to analyze the role of recollection as a basis for responding. We found significant effects of SOI \times identity prime ($B = .02$, $t(162) = 3.02$, $p < .01$) and SOI \times identity threat ($B = -.02$, $t(162) = -3.59$, $p < .001$). See figure 4A (note that the Inclusion results showed a similar pattern). The slope of the SOI effect was positive in the identity prime condition ($B = .02$, $t(162) = 6.54$, $p < .001$), negative in the identity threat condition ($B = -.02$, $t(162) = -6.00$, $p < .001$), and nonsignificant in the control condition ($p > .58$). Spotlight analyses on strong identifiers found that the effect of recollection was lower in the identity threat condition compared to either the identity prime condition ($B = -.51$, $t(162) = -7.80$, $p < .001$) or the control condition ($B = -.31$, $t(162) = -3.66$, $p < .001$) and that it was higher in the identity prime condition than in the control condition ($B = .21$, $t(162) = 2.45$, $p < .02$). See table 2 for the complete spotlight results. None of the effects for identity-neutral brands were significant.

Next, we analyzed the contribution of familiarity as a basis for responding and found significant effects of SOI \times identity prime ($B = .01$, $t(162) = 3.25$, $p < .01$) and SOI \times identity threat ($B = .01$, $t(162) = 2.53$, $p < .02$). See figure 4B (note that the Exclusion results showed a similar pattern). The slope of the SOI effect was positive in both the identity prime ($B = .01$, $t(162) = 5.47$, $p < .001$) and the identity threat conditions ($B = .01$, $t(162) = 4.20$, $p < .001$), and it was nonsignificant in the control condition ($p > .69$). Spotlight analyses found that familiarity's effect among strong identifiers was greater in the identity threat condition than in the control condition ($B = .28$, $t(162) =$

FIGURE 4

STUDY 3: RECOLLECTION AND FAMILIARITY AS A FUNCTION OF IDENTITY CONDITION AND IDENTIFICATION STRENGTH



NOTE.—A, Contribution of recollection; B, contribution of familiarity. The values of identification strength represented on the X-axis range from -1 SD below the mean (43.5) to $+1$ SD above the mean (63.9), with the mean (53.7) at the midpoint.

4.91, $p < .001$) and that it was greater in the identity prime condition than in the control condition ($B = .29$, $t(162) = 5.17$, $p < .001$). See table 2 for the complete spotlight results. None of the effects for identity-neutral brands were significant.

Discussion

Supporting hypothesis 3, the effect of identification strength on interest in university news was negative only in the identity

threat condition, and strong identifiers showed less interest in university news under threat compared to other conditions. These results replicate those of study 2 and thereby provide additional evidence that people are motivated not only to forget threat-related memories but also to avoid the source of social identity threat.

Next, supporting hypothesis 4a, on inclusion trials (i.e., when participants tried to respond using old brands), the effect of identification strength on probability of using old identity-linked brands was positive in the identity prime

condition, negative in the identity threat condition, and non-significant in the control condition. Also, strong identifiers were less likely to use identity-linked brands under threat compared to other conditions. Supporting hypothesis 4b, on exclusion trials (i.e., when participants tried to avoid using old brands), the effect of identification strength on the probability of using (accidentally) old identity-linked brands was positive in the identity prime and identity threat conditions and nonsignificant in the control condition. Also, strong identifiers used identity-linked brands to a similar extent in the identity threat and identity prime conditions but to a lesser extent in the control condition. In sum, the key difference between inclusion and exclusion trials is the effect of threat: threat causes forgetting on inclusion trials and accidental retrieval on exclusion trials. We interpret these results as evidence that threat-related content can be effectively suppressed when the processes that guide suppression operate without conscious control but not when these processes are under conscious control.

Supporting hypothesis 5, as a function of identification strength, threat reduced the contribution of deliberate retrieval strategies (i.e., recollection) but not that of accessibility (i.e., familiarity) as a basis for responding. Also, though recollection was reduced under identity threat compared to identity priming, familiarity was similar in these conditions. These results suggest that the reason why motivated forgetting becomes ineffective when people try to control the process deliberately is because familiarity, which is the driver of accidental retrieval, is unaffected by threat.

EXPERIMENT 4: SOCIAL IDENTITY AFFIRMATION

Study 4 tests whether forgotten memories can be explicitly retrieved if a threatened social identity is affirmed. Affirming an identity's value (e.g., by expressing values shared by in-group members) mitigates social identity threat (White et al. 2012) and makes people more receptive to threatening feedback (Sherman and Cohen 2006). Accordingly, whereas people who are threatened exhibit motivated forgetting, people who are threatened but subsequently given an opportunity to affirm values shared by the in-group should exhibit good memory for identity-linked promotions, similar to people whose identity is primed but not threatened. Moreover, identification strength should moderate these effects. Thus, we hypothesized:

- H6:** The effect of identification strength on recognition memory for identity-linked promotions is negative in an identity threat condition but positive in identity prime and identity affirmation conditions. Among strong identifiers, recognition is reduced in an identity threat condition versus either other condition.

In addition to the identity threat, identity prime, and identity affirmation conditions, we included group-affirmation and self-affirmation conditions. Group affirmation entails affirm-

ing values important to any group(s) to which one belongs. Self-affirmation entails affirming personally important values. We sought to test whether group affirmation or self-affirmation could substitute for identity affirmation. The answer would depend on whether the specific social identity under threat must be affirmed or whether a threat to one aspect of identity can be assuaged by affirming another. While many aspects of self-identity and social identity can provide affirmation, substitution across affirmation mechanisms and domains depends on several factors (Chartrand et al. 2010; Tesser, Martin, and Cornell 1996). Because we had no a priori expectation that substitution would occur, our inclusion of these conditions was exploratory.

Participants and Design

Two hundred and forty-nine HKUST undergraduates participated in exchange for course credit. We excluded six students because of missing data or failure to follow instructions and 13 who were visiting the university as exchange students, leaving 230 for analysis. The design was a 5 (affirmation condition: identity threat, identity prime, identity affirmation, group affirmation, self-affirmation) \times SOI, with affirmation condition manipulated and SOI measured between subjects.

Procedure

The procedure was similar to that of study 1, except that we excluded the control condition and included several affirmation conditions. First, all participants underwent identity priming. Then, with the exception of the identity priming condition, all participants experienced social identity threat. After the threat manipulation, participants in the identity affirmation condition were told to "take a moment to write about things that describe you and other HKUST students (e.g., lifestyle, tastes, and preferences)." Then we presented six categories of values: religion, social life and relationships, business and economics, fine arts, theory, and politics. We asked participants to "rank order the values according to their importance to you and other HKUST students" and then "explain why the first-ranked value is most important" (Allport, Vernon, and Lindzey 1960). Participants in the group affirmation condition completed the same tasks in reference to "you and any social group(s) you belong to." Participants in the self-affirmation condition completed the tasks in reference to "you, personally." Participants in the identity threat and identity prime conditions were asked to "take a moment to describe a movie recently publicized by the media." Next, we asked them to rank the six values based on importance to the general public, then choose the value least important to them and explain why it might be important to someone else. Following the affirmation manipulation, participants completed the recognition memory test used in study 1, demographic questions, the SOI scale ($\alpha = .80$), and funneled debriefing.

Results

We analyzed corrected hits for identity-linked promotions in a linear regression. Because affirmation condition has five levels, the regression included the variables SOI, identity prime, identity affirmation, group affirmation, self-affirmation, SOI \times identity prime, SOI \times identity affirmation, SOI \times group affirmation, and SOI \times self-affirmation. The variables were dummy coded with threat condition = 0. We found significant effects only for SOI \times identity prime ($B = .23$, $t(220) = 3.50$, $p < .01$) and SOI \times identity affirmation ($B = .21$, $t(220) = 3.74$, $p < .001$). See figure 5. See table 3 for the results for all affirmation conditions. The slope of the SOI effect was negative in the identity threat condition ($B = -.15$, $t(220) = -3.29$, $p < .01$) but positive in the identity prime condition ($B = .09$, $t(220) = 1.73$, $p < .09$) and the identity affirmation condition ($B = .06$, $t(220) = 1.85$, $p < .07$). Spotlight analyses for strong identifiers found that corrected hits were higher in the identity affirmation condition compared to the identity threat condition ($B = 1.92$, $t(220) = 3.27$, $p < .01$) but did not differ in the identity affirmation and identity prime conditions ($p > .67$). See table 2 for complete spotlight results.

Discussion

Supporting hypothesis 6, study 4 found that SOI exerts a negative effect on memory for identity-linked promotions in the identity threat condition but a positive effect in both

the identity prime and identity affirmation conditions. Indeed, strong identifiers' memory was not noticeably different in the identity affirmation and identity priming conditions, suggesting that memory is fully restored when people are empowered to confront threat-related material.

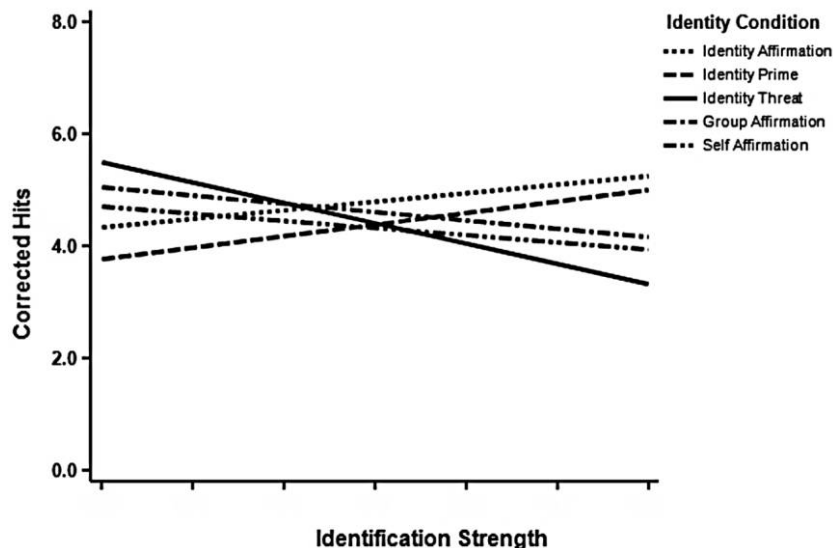
The results also suggest that neither group affirmation nor self-affirmation can adequately substitute for identity affirmation as a means to attenuate social identity threat, as the group affirmation and self-affirmation conditions did not differ from the threat condition. Although it is beyond the scope of this research to delineate factors that affect substitution across different types of affirmation, several factors may explain why substitution was ineffective here. Most notably, White and Argo (2009) showed that social identity threat can be assuaged by self-affirmation but only among people with a weak connection to the threatened identity. In the present study, it is people with the strongest connection to the identity whose memory would benefit most from affirmation, and White and Argo's results imply that self-affirmation may be ineffective for them. To conclude, the results of study 4 are consistent with the theory that retrieval processes selectively avoid material associated with threat so long as the threat remains but do not do so after it is mitigated.

GENERAL DISCUSSION

The present research explores motivated forgetting, the notion that people cope with threatening memories by avoid-

FIGURE 5

STUDY 4: CORRECTED HITS AS A FUNCTION OF IDENTITY CONDITION AND IDENTIFICATION STRENGTH



NOTE.—The values of identification strength represented on the X-axis range from -1 SD below the mean (41.5) to $+1$ SD above the mean (56.2), with the mean (48.8) at the midpoint.

TABLE 3
STUDY 4: EFFECTS ON RECOGNITION MEMORY

Effect	Hits	False alarms	Corrected hits
Identity-linked promotions:			
Identification strength (SOI)	$B = -.11, t = -2.64, p < .01$	$B = .04, t = 2.30, p < .03$	$B = -.15, t = -3.29, p < .01$
Identity prime	$B = -.30, t = -.69, p > .49$	$B = -.27, t = -1.39, p > .16$	$B = -.03, t = -.07, p > .94$
Identity affirmation	$B = .12, t = .30, p > .76$	$B = -.26, t = -1.49, p > .13$	$B = .38, t = .86, p > .38$
Group affirmation	$B = -.06, t = -.15, p > .88$	$B = -.26, t = -1.41, p > .15$	$B = .19, t = .43, p > .67$
Self-affirmation	$B = -.30, t = -.67, p > .50$	$B = -.22, t = -1.08, p > .28$	$B = -.09, t = -.18, p > .86$
SOI × identity prime	$B = .21, t = 3.45, p < .01$	$B = -.03, t = -.99, p > .32$	$B = .23, t = 3.50, p < .01$
SOI × identity affirmation	$B = .18, t = 3.65, p < .001$	$B = -.03, t = -1.16, p > .24$	$B = .21, t = 3.74, p < .001$
SOI × group affirmation	$B = .05, t = .89, p > .37$	$B = -.04, t = -1.60, p > .11$	$B = .09, t = 1.43, p > .15$
SOI × self-affirmation	$B = .09, t = 1.37, p > .17$	$B = -.01, t = -.40, p > .68$	$B = .10, t = 1.39, p > .16$
Identity-neutral promotions:			
Identification strength (SOI)	$B = -.05, t = -.92, p > .35$	$B = .04, t = 1.87, p < .07$	$B = -.09, t = -1.43, p > .15$
Identity prime	$B = -.54, t = -.85, p > .39$	$B = -.21, t = -.97, p > .33$	$B = -.33, t = -.48, p > .63$
Identity affirmation	$B = -.06, t = -.11, p > .91$	$B = -.62, t = -3.22, p < .01$	$B = .56, t = .90, p > .37$
Group affirmation	$B = -.65, t = -1.08, p > .28$	$B = -.16, t = -.79, p > .43$	$B = -.49, t = -.75, p > .45$
Self-affirmation	$B = .14, t = .21, p > .83$	$B = -.61, t = -2.75, p < .01$	$B = .75, t = 1.05, p > .29$
SOI × identity prime	$B = .09, t = 1.02, p > .31$	$B = -.03, t = -1.00, p > .31$	$B = .12, t = 1.25, p > .21$
SOI × identity affirmation	$B = .12, t = 1.60, p > .11$	$B = -.01, t = -.53, p > .55$	$B = .13, t = 1.64, p > .10$
SOI × group affirmation	$B = -.04, t = -.46, p > .64$	$B = -.01, t = -.53, p > .59$	$B = -.02, t = -.24, p > .80$
SOI × self-affirmation	$B = .13, t = 1.42, p > .15$	$B = -.01, t = -.47, p > .64$	$B = .14, t = 1.45, p > .14$

NOTE.—Hits = the percentage of old promotions correctly identified as old; false alarms = the percentage of new promotions incorrectly identified as old; corrected hits = hits – false alarms.

ing their retrieval. We contribute to motivated forgetting research both methodologically and theoretically. Methodologically, we introduce a novel procedure to isolate motivated forgetting. Whereas prior work typically tests memory for threatening content, we tested memory for otherwise neutral content that was followed by threatening feedback. Had we tested memory for the threatening feedback or had participants experienced threat at encoding, forgetting could be due to neglected encoding. By separating threat from the to-be-forgotten content, we can attribute forgetting to neglected retrieval.

Theoretically, we offer a framework that can predict when motivated forgetting is likely to occur, what memories are forgotten, and who is motivated to forget. It draws on research on social identity and psychological threat-based coping to propose that negative feedback about a social identity can motivate people to forget social identity–linked content. This effect occurs among people with a strong connection to the in-group because they have a greater stake in protecting the in-group image and are more harmed by negative feedback about the group. The explicitly forgotten content is not lost from memory; it remains accessible even under threat. As a result, forgotten memories can be recovered via implicit measures, and social identity affirmation can mitigate threat and enable people to confront threat-related content, thereby restoring memory. In addition, we build on the finding that unwanted memories remain accessible in memory to identify a boundary condition that helps reconcile why prior evidence for motivated forgetting is mixed. Prior research tends to use directed forgetting or thought suppression tasks, which ask people to forget or avoid using target material. On such tasks, target content cannot be suppressed, and this is construed as evidence against motivated

forgetting (Geraerts and McNally 2008). We replicate the finding that motivated forgetting is unsuccessful when people deliberately attempt to control it, and we suggest that this happens because the unwanted memories remain accessible in memory, which makes them prone to accidental retrieval (Jacoby 1991). The interesting implication of our results is that motivated forgetting is more likely to be successful when it occurs with minimal conscious control.

This research also contributes to several wider literatures. It demonstrates that motivated forgetting is a coping response to threat and thereby contributes to work on threat-induced coping (Tesser et al. 1996). In addition, this research resides at the intersection of consumer memory and social identity literatures, and it makes a distinct contribution to each. Consumer memory research is dominated by cold cognition approaches that emphasize prior learning, attitudes, and memory mechanics (Alba, Hutchinson, and Lynch 1991; Nedungadi 1990). In comparison, we adopt a situated cognition approach that emphasizes personal and social factors that shape memory. Social identity research has tested effects on product preferences (Berger and Heath 2007), food consumption (O'Guinn and Meyer 1984), ad attitude (Reed 2004), information processing (Meyers-Levy and Sternthal 1991), and so on. Only recently has memory been studied (Mercurio and Forehand 2011), and that work focuses on memory improvement rather than forgetting. Finally, this work is practically important because firms increasingly use targeted strategies like identity-linking but, despite its wide use, identity-linking works only sometimes, can backfire, and may be forgotten (Puntoni et al. 2011; Weigl, Loomis, and Soja 1980; White and Argo 2009). Marketers might consider how social identity threat and identification strength contribute to consumer forgetting. Imagine that a sports bar

offers promotions to fans of a local sports team. If the team is having a bad season, dedicated fans may experience social identity threat and forget about the bar's promotions. Given that most consumer decisions are memory based (Alba et al. 1991), it is vital to develop a complete understanding of the factors that affect memory for ads.

Alternative Explanations

The results of these studies suggest that identification strength and social identity threat affect memory for old identity-linked promotions but not memory for new promotions (i.e., false alarms) or identity-neutral promotions. These collective findings help rule out alternative accounts of the results. One account attributes poor memory to cognitive load or distraction imposed by threat (Schmader and Johns 2003). According to this account, threat preoccupies working memory, and the promotions are not retrieved. However, if this account were correct, we would expect memory for all old content to be poor. Instead, memory is poor for identity-linked and not identity-neutral promotions.

Another account attributes poor memory to nonreporting (Goodman et al. 2003). That is, participants remember the identity-linked promotions but do not want to say so when they are threatened, perhaps to dissociate from the in-group. We rebut this account in three ways. First, we countered any bias toward nonreporting by offering prizes for top memory performance. Second, the false alarm data are inconsistent with nonreporting. If threatened participants chose not to report memory for *old* identity-linked promotions, they also should not report memory for *new* identity-linked promotions. After all, if their goal is to avoid identity-linked content, it should not matter whether the content is old or new. Participants should avoid any association to (i.e., memory for) identity-linked content, and threat should reduce both hits and false alarms (as a function of identification strength). But in fact we obtained only a single false alarm effect—a marginally significant SOI \times identity condition effect in study 1, and, contrary to nonreporting, threat increased rather than decreased false alarms in that study. These data are inconsistent with nonreporting, but they do have one limitation. Most participants made no more than a single false alarm, which raises that possibility that our data simply cannot detect false alarm effects.

The third piece of evidence against nonreporting comes from nonparametric measures of response bias (c) and sensitivity (\hat{A}), which we calculated for studies 1 and 4 (details are available upon request). *Response bias* is one's general tendency to call items "old" or "new." *Sensitivity* is the degree of overlap between the distributions of signal and noise (here, the distributions of old and new promotions). To illustrate the difference, Stanislaw and Todorov (1999) note that the threshold for calling swear words "old" is higher than that for neutral words, which may reflect a change in response bias (e.g., people are more cautious to report swear words) and/or a change in sensitivity (e.g., people are less able to detect swear words). In the present research, a nonreporting account would predict effects on response bias but not necessarily effects on sensitivity. However,

our slope analyses of \hat{A} and c found the opposite. Threat reduced sensitivity but did not significantly increase response bias (as a function of identification strength). These findings are inconsistent with nonreporting, but they also must be interpreted with caution. \hat{A} and c calculations require both "old" and "new" responses. In our studies, participants simply identify which ads are "old" and never respond "new." So, we calculated \hat{A} and c by treating nonresponses as "new" responses, which could introduce bias. This is an important concern, but the results are nevertheless noteworthy because they suggest that forgetting occurs not because of response bias but because social identity threat impairs the ability to discriminate old from new identity-linked promotions.

In sum, the data suggest that the effect of social identity threat on memory retrieval is limited to the specific identity-linked content that is tainted by threat. We interpret the data as evidence that, in the interest of protecting one's image of an in-group, memory search processes selectively avoid retrieving threat-related nodes. No data suggest that the nodes are accessed but not reported or that working memory capacity restricts access to those nodes.

Limitations and Future Directions

Although the present studies demonstrate the "who, what, when, and why" of motivated forgetting, more work is needed to isolate precisely how it occurs. For instance, is threat-related content totally avoided by memory search processes, or is it accessed by search processes and then suppressed? According to prior research, when people suppress thoughts, memory is scanned for traces of to-be-forgotten content and, upon detection, the traces are suppressed (Wegner 1994). When people comprehend words, upon hearing a word that has different meanings (e.g., *red* may mean *red* or *read*), both meanings are accessed and then, if the context suggests that one meaning is correct, the other meaning is inhibited (Shivde and Anderson 2001). Therefore, prior research offers an empirical basis for arguing that, in the case of motivated forgetting, material is accessed and then suppressed. Note, however, that accessing material is not necessarily the same as consciously recollecting it. Indeed, hearing the sentence *She read my article* would not normally bring *red* into conscious thought.

Further research is needed to delineate the conditions that reinstate memories. We find that affirmation enables people to confront threatening content. Affirmation should not erase or change the link between identity-linked promotions and threat, which implies that memory is recovered because affirmation overrides this link. But perhaps retrieval can occur even without affirmation. Suppose, for instance, that an advertised product is useful for repairing feelings of threat. Memory for these ads may improve because consumers stand to benefit psychologically from remembering to buy the advertised products.

Further research is needed to understand why weak identifiers showed reversed effects, with social identity threat enhancing memory for identity-linked promotions. Because weak identifiers do not feel threatened by negative social

identity-related feedback, these effects are based on a process other than motivated forgetting. We would argue that threat improved weak identifiers' memory because the identity-linked promotions were treated as negative but not ego-threatening stimuli. We base this conclusion on prior research that shows that people have good memory for negative stimuli that do not pose a self-identity or social identity threat (e.g., snakes and army tanks; Kensinger 2007). What remains unclear, however, is the process underlying this effect. Prior research that has addressed why negative material tends to be well remembered has implicated greater attention, greater elaboration during encoding, greater distinctiveness of the material, and greater rehearsal (Christianson 1992; Kensinger 2007; Loftus 1993; Ochsner 2000). Drawing on this work, one reason why weak identifiers' memory improved under identity threat versus identity priming (which were identical at encoding) might be that threat boosts rehearsal. Moreover, one reason why weak identifiers' memory was reduced under identity priming versus control might be that priming reduces attention at encoding. Finally, if we consider the results of strength of identification, one interesting hypothesis that emerges from our findings is that the presence or absence of ego threat determines whether negative content is suppressed or retrieved, respectively.

Future research may also explore the role of conscious awareness in motivated forgetting. The results of study 3 show that motivated forgetting is ineffective when people deliberately try to control it. This result does not speak directly to people's level of awareness of the motive itself. To address this issue, we ended each session by checking if participants were suspicious of the cover story, could guess the true purpose of the tasks, or verbalized a motive or tendency to forget. We obtained no evidence for suspicion, awareness, or an intention to forget, and thus we have no reason to suspect that participants were aware of the motive. These results raise the intriguing possibility that motivated forgetting not only operates without conscious control but also without any conscious awareness of the motive itself.

Automaticity has implications for the effort requirements of motivated forgetting. If motivated forgetting operates automatically, it may require fewer resources compared to other coping strategies; it may operate concurrent with other strategies (while some memories are forgotten others are, say, misremembered); it may even operate with greater effectiveness or frequency than other strategies. One way to address these issues is via depletion, cognitive load, or divided attention manipulations that would interfere with motivated forgetting to the extent it requires resources. In fact, a study of this sort might provide additional insight into the role of nonreporting. Nonreporting would predict that resource constraints reduce the ability to control responses and thereby improve memory for threat-related content.

Finally, it is interesting to note how the process of motivated forgetting documented here is different from the one Freud envisioned. Freud (1915/2001) wrote that repression is initiated by an active, conscious intention and that its maintenance requires "an uninterrupted expenditure of force," which, if interrupted, results in the repressed content entering consciousness. Thus, Freud theorized a process of motivated forgetting that bears strong resemblance to directed forgetting and thought suppression and that is notably different from the automatic form of motivated forgetting that may be operating here.

DATA COLLECTION INFORMATION

The first and second authors jointly supervised the collection of data for pretest 2 and studies 2–4 by research assistants at the Hong Kong University of Science and Technology (HKUST) marketing research laboratory. The second author collected data for pretest 1 at the City University of Hong Kong and study 1 at HKUST and Shenzhen University. The data were collected between spring 2009 and autumn 2012. The second author analyzed all data under the supervision of the first author.

APPENDIX A

FIGURE A1

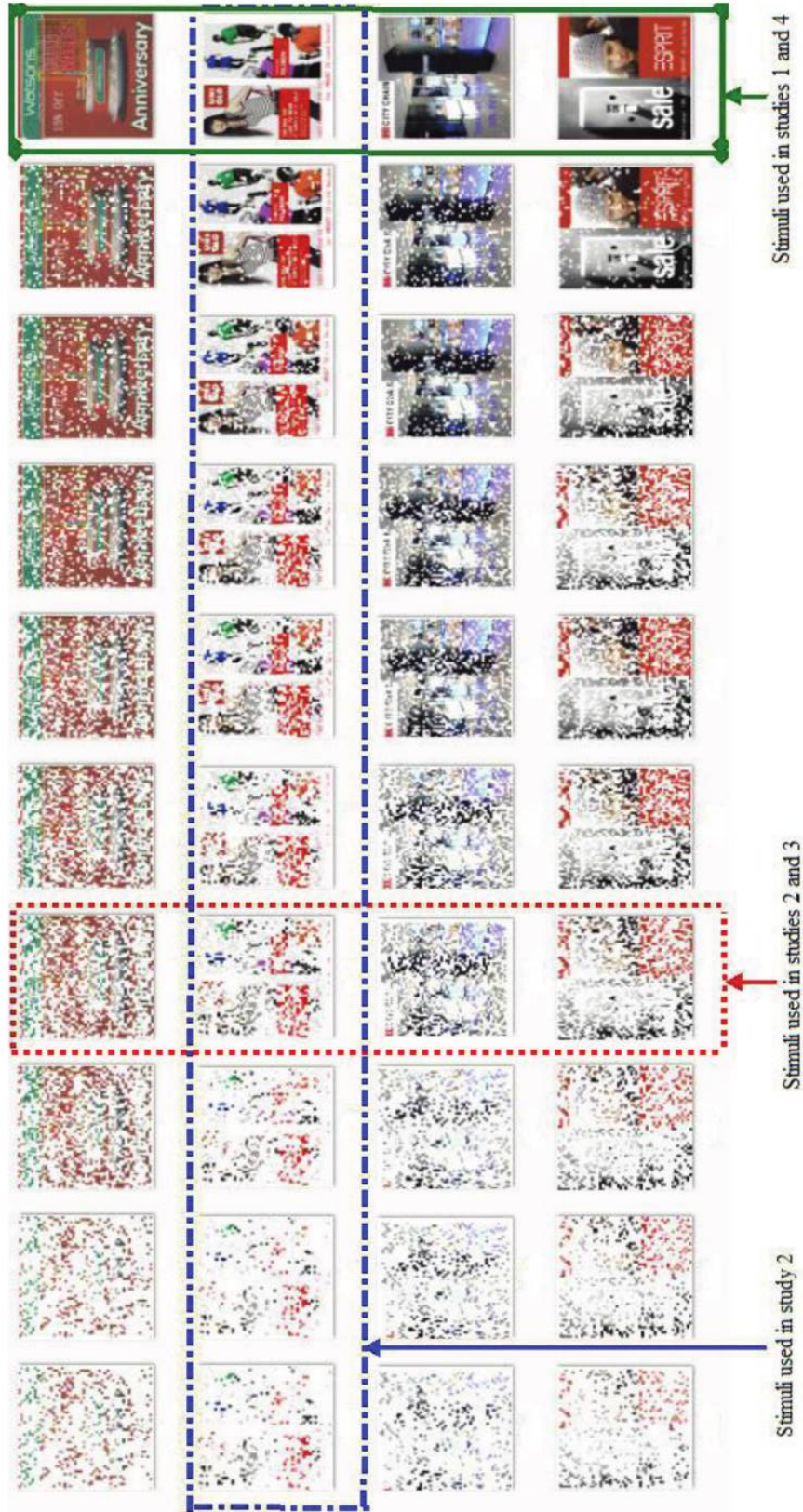
EXAMPLES OF IDENTITY-LINKED PROMOTIONS (TOP PANELS) AND IDENTITY-NEUTRAL PROMOTIONS (BOTTOM PANELS)

 <p>25% WE'RE EXTENDING OUR DISCOUNT TO YOU! Additional 10% off for HKUST ID card holder</p>	 <p>FRIENDS AND FAMILY 20% OFF Additional 10% off for HKUST ID card holder</p>
 <p>AEROPOSTALE Friends & Family 30% off</p>	<p>CLICK HERE TO PRINT</p> <p>Reebok Friends & Family Event</p> <p>40% OFF Your Entire Purchase June 4-8</p>  <p>Reebok ROCKPORT GREG NORMAN OUTLET STORES</p> <p><small>40% DISCOUNT APPLIES TO THE LOWEST PRICED PRICE OF EACH ITEM. Cannot be combined with 30% card ending sale pricing. Buy 1, Get 1, 50% Off, Buy 2, Get 3rd Free, 2 For 1, 50% promotions or with any other coupon or member discount offer. Lowest Ticketed Price is either the regular retail price or clearance price (where applicable). Excludes prior purchases, gift cards, Footwear Search, and Jersey Search. Some restrictions apply. Valid only at U.S. Reebok, Rockport, and Greg Norman Outlet Stores between 6/4/10 - 6/8/10. Coupon must be submitted at time of purchase. Subject to store hours.</small></p> <p>Promo Code # 726970</p>

APPENDIX B

FIGURE B1

EXAMPLES OF ADVERTISEMENTS USED IN STUDIES 1-4



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