

ALWAYS ON MY MIND: THE ROLE OF AUTOMATIC THOUGHTS IN THE
EXPERIENCE AND DEVELOPMENT OF PASSIONS

Elise L. Rice

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Approved by:

Barbara L. Fredrickson

Kristen A. Lindquist

B. Keith Payne

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ABSTRACT

Elise L. Rice: Always on my mind: The role of automatic thoughts in the experience and development of passions
(Under the direction of Barbara L. Fredrickson)

The present research explored how automatic thoughts about passions influence the ways in which people pursue them. Drawing from the dualistic model of passions and incentive-salience theory, I predicted that positive emotions experienced during an activity should facilitate positive automatic thoughts about that activity. Those thoughts should in turn facilitate wanting and build resources that increase the positive-emotion yield of subsequent behavior. Studies 1 and 2 revealed that people perceive more positive automatic thoughts about harmonious than obsessive passions. In Study 3, positive automatic thoughts mediated the effect of positive emotions on behavior. Studies 4 and 5 documented that positive automatic thoughts predict increases in harmonious passion over time and vice versa. Taken together, these findings characterize the role of automatic thoughts as they relate to the pursuit of passions in particular and desired outcomes in general.

To Daniel, Mirabelle, and so many others.
Thank you for inspiring countless positive automatic thoughts.

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TABLE OF CONTENTS

LIST OF TABLES.....	viii
LIST OF FIGURES.....	ix
INTRODUCTION.....	1
Incentive Salience.....	4
The Dualistic Model of Passion.....	6
The Present Studies.....	10
STUDY 1.....	12
Methods.....	12
Results.....	14
Discussion.....	18
STUDY 2.....	19
Methods.....	19
Results.....	21
Discussion.....	24
STUDY 3.....	24
Methods.....	25
Results.....	26
Discussion.....	28
STUDY 4.....	29
Methods.....	29

Results.....	30
Discussion.....	32
STUDY 5.....	33
Methods.....	33
Results.....	35
Discussion.....	36
GENERAL DISCUSSION.....	37
REFERENCES.....	42

LIST OF TABLES

Table 1 – Passion criteria across activity types in Study 1	15
Table 2 – Parameter estimates for Study 1 equations predicting thought frequency.....	17
Table 3 – Likelihood of endorsing other response options relative to “Mostly or entirely positive”	18
Table 4 – Descriptive statistics for key variables in Study 2.....	21
Table 5 – Descriptive statistics for key variables in Study 3.....	26
Table 6 – Descriptive statistics for key variables in Study 4.....	31
Table 7 – Descriptive statistics for key variables in Study 5.....	35

LIST OF FIGURES

Figure 1 – Positive automatic thoughts mediate the relationship between liking and wanting.....	27
Figure 2 – Positive automatic thoughts mediate the relationship between harmonious passion and wanting.....	28

INTRODUCTION

In addition to all the seemingly deliberate thinking humans engage in every day, people also experience a substantial number of thoughts that arise unbidden. Sometimes, these thoughts take the form of unpleasant musings – perhaps the mounting discomfort of an empty stomach or the pain of a recent romantic flop – that in the most severe cases may even have clinical implications. In the scientific literature, such thoughts have been referred to as intrusive (e.g., Lepore, 1997) and involuntary (e.g., Berntsen, 1996). Although previous research has focused on unpleasant cognitions, these phenomena fail to represent the affective variability in the normative thoughts people experience every day; most thoughts are probably not experienced as *intrusive*. For example, one may simply catch herself suddenly smiling at the thought of the latest cat video she saw on the internet or the warm memory of a family vacation. Given that positive emotions tend to demand less attention than negative emotions (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001), pleasant spontaneous thoughts are probably more likely to fly by unnoticed, though that does not necessarily mean their effects on daily life are trivial. Indeed, given that experiences of positive emotions tend to outnumber negative emotions for most healthy people (Catalino & Fredrickson, 2011; Fredrickson, 2013; Fredrickson & Losada, 2005), positive spontaneous thoughts may well be more numerous than their negative counterparts.

Across the five studies reported herein, I explore how positive automatic thoughts arise in everyday life and evaluate their role in motivation. Despite the previous convention to refer to unintended thoughts as intrusive or involuntary, I prefer a nomenclature that has no clear

connotation, given that these thoughts may be positively or negatively valenced, if they have valence at all. As such, I refer to these thoughts that arise without the conscious experience of effort or intention as *automatic* or *spontaneous* thoughts.

One context in which positive automatic thoughts may be particularly important is that of people's favorite activities, i.e., their *passions*. As defined in previous research (Vallerand et al., 2003), passions are any activity (or other meaningful construct, such as a relationship with a significant other, as in Ratelle, Carbonneau, Vallerand, & Mageau, 2013) that has been internalized as part of the self. Critically, these activities are those that people enjoy, that they consider to be important, and in which they invest substantial amounts of time on a regular basis. Several otherwise distinct lines of research, described below, collectively suggest that these defining features of passions make them prime candidates for studying positive automatic thoughts.

First, given the significance of passions in people's lives, I expect them to have "chronic" or "preconscious" automaticity (Bargh, 1989, 1994), which is to say that they have consistently heightened accessibility, making them more likely to emerge within conscious awareness at any given time. Relatedly, research on the preconscious automaticity of self-relevant constructs (Bargh, 1982) has documented that people attend to self-relevant stimuli particularly readily and demonstrate difficulty ignoring them to attend to other information.

Second, because passions are activities that people enjoy, I expect passions (as well as cues related to those activities) to be imbued with nonconscious incentive salience (Berridge, 2007; Smith, Berridge, & Aldridge, 2011), a property thought to promote "wanting," or motivation to resume the activity. Incentive salience operates by drawing attention to previously rewarding objects or concepts as well as cues associated with them. In one empirical demonstration of this effect, participants who were asked to match the font size of target words

to an array of different-sized reference letters overestimated the size of positive words relative to neutral words (Ode, Winters, & Robinson, 2012); positive words literally loomed larger than others. It seems plausible that positive automatic thoughts may be indicators of heightened incentive salience, which facilitates the activation of passion-related concepts above the threshold of conscious awareness. That is, the heightened accessibility of concepts endowed with incentive salience may make them more likely to pop into conscious awareness in the form of automatic thoughts. Moreover, to the extent that positive automatic thoughts promote effort and wanting, they may be one mechanism through which incentive salience influences behavior. Given that people perceive their spontaneous thoughts as more informative or meaningful than deliberate cognitions (Morewedge, Giblin, & Norton, 2014), experiencing positive spontaneous thoughts about a favorite activity might prompt an individual to pursue that activity with increased enthusiasm. In light of research on the Zeigarnik effect, which shows that people tend to have spontaneous thoughts about unfinished goals (Martin & Tesser, 1989), positive thoughts may arise automatically to “nudge” people to engage in their favorite activities on a regular basis.

Third, just as processes related to passions may trigger positive automatic thoughts about a favorite activity, the reciprocal effect may also arise, such that positive automatic thoughts influence qualities of the passion itself. That is, to the extent that positive emotions broaden mindsets and build resources (Fredrickson, 1998, 2001, 2013), spontaneous thoughts laden with positive affect may promote the perceptions of autonomy and personal control that characterize more adaptive behaviors related to pursuing passions (Vallerand et al., 2003). Specifically, through the broadening effect of positive emotions (Fredrickson & Branigan, 2005), positive automatic thoughts may increase cognitive flexibility, which in turn may allow individuals to

generate more ways of pursuing their favorite activity rather than rigidly adhering to the first idea that comes to mind.

My focus in these studies is on people's automatic thoughts about their passions and how those thoughts may ultimately shape the ways people pursue their favorite activities.

Specifically, I explore whether and how positive automatic thoughts about a passion promote patterns of activity engagement that are flexible and sustainable. Further, I identify one way in which spontaneous thoughts are implicated in motivational processes more generally as indicators of incentive salience. As such, it is important to preface these studies with a review of the existing literatures on incentive salience and passions.

Incentive Salience

Incentive-salience theory (Berridge, 2007) addresses the question of how dopamine is involved in reward by separating reward processing into three components: liking, wanting, and learning. Prior to this distinction, existing theories were unable to fully account for research demonstrating that dopamine manipulations seemed to increase appetitive behavior toward a target stimulus with no effect on how well the stimulus was liked. In particular, incentive-salience theory suggests that dopamine facilitates only the "wanting" component of reward, which is separately guided by "liking" and "learning" (Berridge, 2007; Smith et al., 2011). That is, when an individual repeatedly encounters a stimulus that is experienced as pleasant ("liking"), the learned associations between that pleasantness and the cues that are predictive of the desired outcome endow those cues with incentive salience. That heightened incentive salience in turn prompts wanting and reward-seeking behaviors when the individual encounters the salient cues.

Some of the strongest support for incentive-salience theory comes from research on mice bred to express elevated levels of dopamine. Consistent with the predictions of incentive-salience theory, these mice demonstrate increased motivation to work for food in the absence of learning

(Cagniard, Balsam, Brunner, & Zhuang, 2005). Likewise, other studies have documented that the same hyperdopaminergic mice do not produce heightened facial reactions consistent with liking (e.g., rhythmic tongue protrusion) in sucrose taste tests (Peciña, Cagniard, Berridge, Aldridge, & Zhuang, 2003). Though direct tests of incentive-salience theory have traditionally been easier to conduct in rodents (e.g., neuronal recording in rats has revealed distinct neural representations of liking, wanting, and learning; Smith et al., 2011), complementary effects have emerged in some human samples. For example, positively valenced words are perceived in ways suggestive of heightened approach motivation; that is, participants overestimate the size of the text in which positive words are presented as well as the duration of time for which they are displayed, implying that these cues possess a particular perceptual magnetism (Ode et al., 2012). More extreme demonstrations of the incentive-salience system at work in humans may be found in cases of addiction. In particular, the notable dissociation between liking and wanting that occurs as addiction progresses (i.e., liking decreases as wanting increases) is consistent with the notion that the neural systems altered in addiction mediate incentive salience but not pleasure (Robinson & Berridge, 2008).

Given this conceptualization, positive spontaneous thoughts may be related to incentive salience in two ways. First, spontaneous thoughts may be indicators of incentive salience attributed to reward cues. That is, objects and other targets with heightened incentive salience are more likely to capture attention and thereby may be more likely to emerge into conscious awareness at any given time, possibly in the form of positive spontaneous thoughts. In this sense, spontaneous thoughts may be little more than an interesting epiphenomenon of incentive salience. A second possibility, however, is that positive automatic thoughts may be an active ingredient through which incentive salience inspires reward-seeking behavior. If the attribution of incentive salience promotes positive automatic thoughts through heightened accessibility and

related processes, those thoughts may in turn compound the sense of wanting the object or outcome, lead to planning how one will pursue the object or outcome, etc. I favor this second possibility, Indeed, a central hypothesis of the current studies is that positive spontaneous thoughts occupy a position between liking and wanting given their predicted relation to incentive salience.

The Dualistic Model of Passion

Prior research on people's favorite activities has documented that passions are generally characterized to varying degrees by two types of qualities: harmonious and obsessive (Vallerand et al., 2003). Whereas harmonious passions are internalized autonomously and tend not to interfere with other domains in one's life, obsessive passions are internalized through controlled¹ processes and may routinely come into conflict with one's other relationships, obligations, etc. Further, whereas obsessive passions are associated with contingencies such as social pressure or self-esteem, harmonious passions tend to be free of these restraints, and thus people may pursue them more flexibly. For example, an individual who is harmoniously passionate about playing the flute derives enjoyment from practicing when time allows, though she also readily puts the instrument away when manuscript preparation and other duties demand attention. However, someone who is obsessively passionate about playing a musical instrument continues to practice, even at the expense of both the music (knowing she should be writing instead arouses anxiety that interferes with breath support) and her work, which ultimately does not receive the time it deserves.

¹ Note that the distinction between "autonomous" and "controlled" processes here relates to features of motivation (similar to intrinsic versus extrinsic) and should not be confused with "automatic" and "controlled" processes in the conscious vs. nonconscious sense. As described here, autonomous and controlled processes may be represented in both deliberate and nonconscious processing.

Typically, features of both types of passions have been measured via self-report methodologies using a well-developed and validated scale. The Passion Scale (Vallerand et al., 2003; Marsh et al., 2013) consists of 14 items that load on two factors (7 items per factor), each representing one subtype of passions. The harmonious factor includes items such as “This activity allows me to live a variety of experiences” and “The new things that I discover with this activity allow me to like it even more.” Alternatively, the obsessive factor contains items such as “I have difficulty imagining my life without this activity” and “My mood depends on me being able to do this activity.” Because most of people’s favorite activities tend to have some features of both types of passion to varying degrees, it is common to account for both subscale scores simultaneously in relevant analyses. In some cases, however, the nature of the research question warrants comparing subscale scores to classify a given activity as either a harmonious or obsessive passion.

Given the very definition of passions – that they are important and enjoyable to the individual and are allotted a substantial amount of time – it is not surprising that they seem to have sizable influences on well-being. Across two studies (one cross-sectional and the other involving repeated measures over the course of a year), being harmoniously passionate about one’s favorite activity predicted greater hedonic and eudaimonic well-being than being obsessively passionate or nonpassionate, which did not differ (Philippe, Vallerand, & Lavigne, 2009). As such, it seems that being harmoniously passionate about an activity is the optimal scenario for producing subjective well-being, though being obsessively passionate is not necessarily detrimental to well-being relative to not having a passion at all.

Other studies that have more directly compared harmonious and obsessive passion have yielded results that are consistent with this pattern. In previous research, more harmonious passion consistently predicts greater satisfaction with life (Carpentier, Mageau, & Vallerand,

2012; Rousseau & Vallerand, 2003 as described in Vallerand, 2010; Vallerand et al., 2007; Vallerand et al., 2008), meaning in life and vitality (Rousseau & Vallerand, 2003), and experiences of flow (Carpentier et al., 2012). On the other hand, obsessive passion tends to predict lower satisfaction with life (Carpentier et al., 2012; Rousseau & Vallerand, 2003, as described in Vallerand, 2010; Rousseau & Vallerand, 2008; Vallerand et al., 2007, Study 2), though in a few samples, obsessive passion has been unrelated to life satisfaction (Vallerand et al., 2007, Study 1; Vallerand et al., 2008). Additionally, obsessive passion has been linked to other constructs associated with low levels of well-being including greater anxiety and depression (Rousseau & Vallerand, 2003) and greater cancer worry in a study of breast-cancer survivors (as a rare counter-example, breast-cancer survivors who were more obsessively passionate about their favorite activity did exhibit greater post-traumatic growth; Burke, Sabiston, & Vallerand, 2012)

Initial and on-going development of passions

Given the import of passion type for people's lives while engaged in the activity and over the long term, it is important to understand how passions develop as relatively more harmonious or obsessive, both initially and over time. Prior research on passions has identified environmental or social factors as well as personality traits that predict whether a given favorite activity will become more harmonious or obsessive. For example, a series of studies that used both correlational and longitudinal methods (Mageau et al., 2009) demonstrated that factors such as autonomy support and parental valuation of the activity differentially predict whether an activity is likely to become more harmonious or obsessive for early practitioners. Another series of cross-sectional and longitudinal studies (Vallerand et al., 2006, Studies 1 and 3) found that autonomous personality (i.e., tending to do things out of personal choice) predicted both harmonious and obsessive passion, whereas controlled personality (i.e., tending to do things as a

result of inner or outer pressure) predicted only obsessive passion. Whereas previous attempts to chart the development of harmonious and obsessive passions have focused on broad factors related to the environment or personality, I turn to more micro-level phenomena, namely, automatic or spontaneous thoughts, which may also play a role in the differential growth and maintenance of passions.

Affective and cognitive processes associated with passion

Much of the existing research on passions aims to unpack the affective processes that underlie differences between harmonious and obsessive passions. The Dualistic Model of Passions predicts that harmonious passions should be positively related to positive emotions and negatively related or unrelated to negative emotions, whereas obsessive passions should be positively related to negative emotions and negatively related to or unrelated to positive emotions. Generally speaking, these hypotheses are supported by ample research.

Harmonious passion is consistently related to experiences of positive emotions both during and after activity engagement across multiple studies (Bureau, Vallerand, Ntoumanis, & Lafrenière, 2013; Burke et al., 2012; Mageau & Vallerand, 2007; Mageau, Vallerand, Rousseau, Ratelle, & Provencher, 2005; Philippe, Vallerand, Houliort, Lavigne, & Donahue, 2010; François L. Rousseau & Vallerand, 2008; Vallerand et al., 2003), and harmonious passion also predicts lower negative emotions in some cases (Mageau et al., 2005; Philippe et al., 2010). However, evidence of the relationships between obsessive passion and affect has been mixed. In most cases, obsessive passion seems to solely predict greater negative emotions, such as shame (Vallerand et al., 2003) and fear of failure (Bélanger, Lafrenière, Vallerand, & Kruglanski, 2013, Study 4) during activity engagement (Philippe et al., 2010; Rousseau & Vallerand, 2008), when prevented from engaging in the activity (Vallerand et al., 2003), and in everyday life (Burke et al., 2012), although obsessive passion may also predict lower positive emotions (Mageau et al.,

2005). Further, longitudinal studies have demonstrated that the simple associations between passion type and affect described above also play out systematically over time, suggestive of causal processes (Mageau & Vallerand, 2007; Vallerand et al., 2003, Study 2).

Prior research relating harmonious and obsessive passions to more cognitive phenomena has generally focused on attention. In one study (Carpentier et al., 2012), harmonious passion was positively related to experiences of flow both during activity engagement and while engaged in *other* activities (e.g., studying), suggesting that harmoniously passionate individuals were generally able to disengage from their passion when other pursuits demanded attention, consistent with the predictions of the theoretical model. By contrast, obsessive passion was associated with a tendency to ruminate on the passion activity while engaged in other activities (e.g., course work), which in turn predicted inhibited flow. In a separate study of individuals who were passionate about gambling (Mageau et al., 2005), both harmonious and obsessive passion were associated with greater reported concentration during the activity, although more harmonious passion predicted greater feelings of control during the activity, whereas obsessive passion predicted lesser feelings of control.

The present studies

I conceptualize the relation between harmonious passion and positive automatic thoughts as a positive feedback loop. When individuals encounter a new activity that they enjoy, I predict they will experience increasingly frequent positive automatic thoughts about how much they enjoyed the activity, which in turn inspires them to plan to do it again soon. These thoughts may in turn promote patterns of behavior for pursuing that activity that are consistent with features of harmonious passion, by enabling individuals to be particularly flexible about the ways they approach the activity. To the extent that the activity continues to promote positive emotions and enjoyment, the cycle should continue in an upward spiral dynamic (Fredrickson, 2013).

Four hypotheses follow from my predicted cyclical model. First, given the significance of passions in people's lives (and the chronic automaticity that should accompany it), people who are increasingly passionate about their favorite activities should experience more frequent automatic thoughts about those activities. Second, given the pattern of affective experiences typically associated with harmonious and obsessive passions, I expect harmonious passions to be associated with spontaneous thoughts that are more pleasant or positive than those associated with obsessive passions. Third, given that positive emotions broaden cognition, increasingly positive automatic thoughts should promote the development of harmonious passions over time. Fourth, to the extent that automatic thoughts represent nonconscious incentive salience, they should account for (mediate) the association between liking (positive emotions during engagement) and wanting (motivation to repeat the activity).

The five studies presented herein constitute an initial attempt to investigate the relationship between passions and automatic thoughts. In Study 1, I compare the frequency and valence of the automatic thoughts participants report having about nonpassions, harmonious passions, and obsessive passions. I build on these findings in Study 2 by manipulating passion type (harmonious versus obsessive) and measuring properties of the thoughts that arise in a subsequent thought-listing task. I broaden my scope in Study 3 to evaluate positive automatic thoughts as a mediator between positive emotions ("liking") and frequency of behavior (a behavioral index of wanting). In Study 4, I explore the interplay of passion type and automatic thoughts over time in a prospective, repeated-measures design. Finally, in Study 5, I replicate these prospective findings in an interpersonal context and extend them by exploring analogous processes among negative thoughts and obsessive passions.

STUDY 1

The primary purpose of the first study was to evaluate how different kinds of passions relate to patterns of automatic thoughts. I predicted that people would report experiencing more frequent automatic thoughts about passions than nonpassions, given that, by definition, passions have heightened significance in people's lives. Further, I predicted that automatic thoughts about harmonious passions should be relatively more pleasant than automatic thoughts about obsessive passions, given previous findings on how emotional experiences differ across passion type (e.g., Vallerand et al., 2003). To test these hypotheses, I recruited an MTurk sample and asked each participant to report on three different kinds of activities: a nonpassion, a harmonious passion, and an obsessive passion.

Methods

Participants

One hundred seventy adults living in the United States completed the study through Amazon Mechanical Turk. Due to experimenter error, demographic data were not collected for the first 20 participants, but of the 150 participants who reported age, the mean was 35.45 ($SD = 13.72$); of the 149 participants who reported gender, 94 (63%) were female. All participants received monetary compensation.

Procedure

Participants who provided informed consent reported on three different activities (i.e., one nonpassion, one harmonious passion, and one obsessive passion) in randomized order based on the following prompts (with emphases as indicated below). I developed these prompts based on the criteria for passions and items included in the Passion Scale (Vallerand et al., 2003):

Nonpassion (NP):

“Please report an activity that you engage in often, but that you consider to be relatively neutral or at least not among your favorite activities.”

Harmonious Passion (HP):

“Please describe one of your favorite activities. This activity should be something significant to you, which you do for pure enjoyment. In other words, you do this activity for yourself without feeling like you are compelled to do it for any reason.”

Obsessive Passion (OP):

“Please describe one of your favorite activities. This activity should be something significant to you, which you enjoy and value, but which you also occasionally feel compelled to do.”

After describing the first activity, participants responded to three items designed to target the defining criteria of passions. The first asked participants to indicate how often they engage in the activity using a 6-point response scale ranging from “Less than once a month” to “Daily.” The second question asked participants to indicate how much they enjoy the activity using a 5-point response scale ranging from “Not at all” to “Extremely.” The third question asked participants to indicate how important the activity was to them using a 5-point response scale ranging from “Not at all” to “Extremely.”

Next, participants answered two questions about the automatic thoughts they tend to notice about the activity in question. First, participants were asked “how often do thoughts about this activity seem to pop into your head?” and responded using a 5-point response scale ranging from “Never” to “All the time.” The second question asked “When thoughts about this activity pop into your head or just come to you, what do they tend to be like?” and listed four categorical

response options: “Entirely or mostly negative,” “Entirely or mostly positive,” “A fairly equal mix of negative and positive,” and “Fairly neutral (neither positive nor negative).”

Last, participants completed the Passion Scale (Vallerand et al., 2003) for the given activity. The Passion Scale is a psychometrically sound and validated (Marsh et al., 2013) 14-item Likert scale with items pertaining to characteristics of harmonious passion (e.g., “This activity allows me to live a variety of experiences”) and obsessive passion (e.g., “I am emotionally dependent on this activity”). As in past research, the overall scale and both subscales demonstrated adequate reliability (see Results section).

After completing the first block, participants completed the same set of measures for the remaining two activities. Last, participants provided demographic information (age and gender) and read a debriefing statement that explained the purpose of the experiment and the hypotheses.

Analytic Methods

SAS 9.3 was used to conduct the primary analyses in this study, and SPSS Statistics 22 was used to conduct preliminary analyses. After evaluating descriptive statistics and the success of my passion-type filter, I tested my primary hypotheses using multilevel modeling procedures (PROC MIXED) with restricted maximum likelihood (REML) estimation. Model building was entirely theory driven, and individual parameters were examined to determine significance at the level of $\alpha = 0.05$. Missing data (e.g., items left unanswered by participants) were processed using listwise deletion.

Results

Descriptive Statistics

Representative activities reported as nonpassions include reading the news, doing the dishes, and going on walks. Participants reported activities such as reading, playing video games,

and playing a sport in both passion categories (several activities appeared in all three categories). See Table 1 for descriptive statistics on key statistics by condition.

Table 1

Passion criteria across activity types in Study 1

Variable	Activity Type	<i>n</i>	<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>SE</i>
Frequency	NP	170	1	6	4.68	0.104
	HP	170	1	6	4.75	0.113
	OP	169	1	6	4.55	0.112
Enjoyment	NP	170	1	5	2.72	0.076
	HP	170	2	5	4.43	0.052
	OP	169	2	5	4.21	0.059
Significance	NP	170	1	5	3.26	0.084
	HP	170	1	5	3.95	0.067
	OP	168	2	5	3.97	0.069

Preliminary Analyses

Because I designed the activity prompts to produce differences in significance and enjoyment but not in frequency of engagement, each passion criterion was analyzed individually (see Table 1 for criteria means across conditions). Separate repeated-measures ANOVAs revealed that as intended, frequency did not differ across passion type, $F(2, 334) = 0.927, p = .397$. Further, there were significant differences across passion type in terms of enjoyment, $F(2, 334) = 242.565, p < .001$ and significance, $F(2, 334) = 32.412, p < .001$. Post hoc paired *t*-tests (using the Bonferroni correction to account for multiple comparisons, *p*-values less than .0167 indicate significant effects) revealed that enjoyment scores differed across all three types of activities ($ps < .001$). Significance scores for nonpassions differed from harmonious passions, $t(169) = -6.892, p < .001$ and obsessive passions, $t(167) = -6.919, p < .001$, but there was no difference between the two types of passions, $t(167) = -0.187, p = .852$.

To determine whether the harmonious and obsessive prompts I developed cued the expected activity types, I computed subscale scores (all of which produced acceptable reliability: α s 0.80 - 0.91) for each activity from the Passion Scale. I submitted the obsessive and harmonious subscale scores to separate repeated-measures ANOVAs, which revealed significant differences across passion types for both measures, $F_{HP}(2, 332) = 108.732, p < .001, F_{OP}(2, 332) = 42.565, p < .001$. For both subscales, the nonpassion activity differed from both types of passion ($ps < .001$), but the two passion groups did not differ in terms of harmonious, $t(166) = 1.249, p = .213$ or obsessive, $t(167) = -0.949, p = .344$ subscale scores.

Given the failure of my prompts to reliably separate harmonious and obsessive passions, I treated activity type as a measured variable and used the subscale scores from the Passion Scale as continuous predictor variables in my primary analyses. This approach is a commonly used analytic strategy in prior research (e.g., Vallerand et al., 2003).

Primary Analyses

To test my hypothesis that people would perceive automatic thoughts about passions more frequently than thoughts about nonpassions, I submitted my thought-frequency data to two-level hierarchical linear models (HLMs) with activities (level 1) nested within participants (level 2). Consistent with my hypothesis that both types of passion activities would be associated with equally frequent automatic thoughts, harmonious ($\beta = 0.082, SE = 0.006, p < .001$) and obsessive ($\beta = 0.077, SE = 0.005, p < .001$) features were both significant as sole predictors of thought frequency. Further, when both subscale scores were included in the model simultaneously, they each continued to predict thought frequency above and beyond the effects of the other (see Table 2 for parameter estimates and descriptive statistics). Finally, both remained significant predictors of thought frequency above and beyond enjoyment and significance when the latter variables

were included as covariates in subsequent models, ruling out the possibility that differences in enjoyment or significance account for the effects.

Table 2

Parameter estimates for Study 1 equations predicting thought frequency

Model	Parameter	β	<i>SE</i>	<i>p</i>	<i>CI Lower</i>	<i>CI Upper</i>
1	Intercept	1.428	0.144	.001	1.143	1.713
	HP	0.082	0.006	.001	0.071	0.094
2	Intercept	2.011	0.103	.001	1.807	2.215
	OP	0.077	0.005	.001	0.067	0.087
3	Intercept	1.227	0.135	.001	0.960	1.494
	HP	0.053	0.006	.001	0.040	0.065
	OP	0.050	0.006	.001	0.039	0.061
4	Intercept	1.175	0.131	.001	0.916	1.434
	HP	0.019	0.008	.022	0.003	0.035
	OP	0.048	0.006	.001	0.037	0.059
	Enjoyment	0.241	0.039	.001	0.164	0.318
5	Intercept	0.808	0.135	.001	0.542	1.075
	HP	0.034	0.006	.001	0.022	0.046
	OP	0.033	0.006	.001	0.022	0.044
	Importance	0.318	0.036	.001	0.247	0.388

Note: Confidence intervals displayed correspond to $\alpha = 0.05$.

To test my second hypothesis that harmonious passion is associated with greater positivity in automatic thoughts than obsessive passion, I created a multilevel logistical regression model (with activities at level 1 and participants at level 2) with harmonious and obsessive subscale scores predicting responses to the thought-valence item. Increasingly harmonious passions were associated with lower likelihoods of endorsing any other response option relative to “mostly or entirely positive” (see Table 3 for parameter estimates). However, increasingly obsessive passions were not related to the likelihood of endorsing any particular response option relative to “mostly or entirely positive.”

Table 3

Likelihood of endorsing other response options relative to “Mostly or entirely positive”

Parameter	Response	DF	Estimate	SE	Wald X^2	<i>p</i>
Intercept	Negative	1	3.384	1.276	7.034	.008
	Neutral	1	3.571	0.537	44.208	<.001
	Mix	1	3.306	0.934	12.523	<.001
HP	Negative	1	-0.272	0.062	19.569	<.001
	Neutral	1	-0.216	0.027	64.752	<.001
	Mix	1	-0.196	0.041	22.585	<.001
OP	Negative	1	0.031	0.031	1.009	.315
	Neutral	1	0.035	0.023	2.337	.126
	Mix	1	-0.027	0.028	0.951	.330

Discussion

The results of Study 1 illustrate systematic differences in self-reported patterns of automatic thoughts between passions and nonpassions as well as between harmonious and obsessive passions. Consistent with my first hypothesis, increasingly passionate tendencies were associated with more frequent automatic thoughts about an activity. Further, harmonious and obsessive passion each independently predicted increasing frequency of automatic thoughts about the activity in question. Consistent with my second hypothesis, more harmonious passions were associated with greater positivity in automatic thoughts about the activity, whereas no particular relationship between obsessive passion and positivity in automatic thoughts emerged.

This study is subject to several limitations. First, my filter failed to separate harmonious and obsessive passions as intended, although I was able to treat passion type as a measured variable, and the results were consistent with my hypotheses nevertheless. Second, data in this study were self-reported, which may have introduced bias, and relatedly, although I designed my measures of automatic thought frequency and valence to be relatively straightforward for

participants to answer, I cannot be certain that participants have sufficient access to this kind of knowledge about their thought patterns. Diminishing these issues was a central goal of Study 2.

STUDY 2

In Study 2, I extend the results of Study 1 by adding experimental control over passion type to support causal inferences about the relation between passion type and the valence of automatic thoughts. I also employed a thought-listing task to corroborate the results obtained with my previous thought measures. Specifically, I manipulated passion type by randomly assigning participants to one of three prompts developed to prime harmonious versus obsessive features of a given passion (vs. a neutral control, c.f., Belanger et al., 2013) and measured the actual thoughts participants experienced (rather than perceived patterns of thoughts) by asking participants to list their thoughts in real time. I predicted that participants primed to consider harmonious aspects of their passion would experience more positive automatic thoughts about their favorite activity relative to participants primed to consider obsessive aspects, or those not primed. However, I predicted no differences in thought frequency (i.e., number of thoughts about the activity in the allotted time period) across the two experimental conditions.

Methods

Participants

Ninety-six adults living in the United States (54 women; $M_{age} = 37.38$, $SD = 13.94$) completed the study in exchange for monetary compensation through MTurk. Though the majority of participants (72.9%) identified as Caucasian, other ethnicities were represented in the sample (African American, 10.4%; Asian, 11.5%, Hispanic, 3.1%, etc.).

Procedures and measures

Participants who provided informed consent began the study by reporting the name of their favorite activity. Further, based on the defining criteria of passions (Vallerand et al., 2003),

the overarching prompt specified that participants should choose an activity that they enjoy, that is important to them, and in which they invest a significant amount of time on a regular basis.

Next, participants completed a 3-minute writing task that served to manipulate passion type. As in previous research (Belanger et al., 2013), participants in the two experimental conditions were instructed to write about a time when they felt their favorite activity was in harmony with other things that are a part of them (harmonious condition) or to write about a time when they had difficulty controlling their urge to do the activity (obsessive condition). Participants in the control condition were asked to write about a time when they had to borrow a book from the library.

Next, participants completed a 3-minute thought-listing task. Participants were asked to type a keyword or brief phrase for each thought that crossed their mind. Because participants in previous studies have found this task difficult, the instructions suggested that closing one's eyes or focusing on the sound of one's breathing might be helpful. As participants reported each thought, they were also asked to rate how automatic versus intended that thought seemed to be using a 5-point response scale that ranged from "not at all automatic" to "entirely automatic." The instructions specified that a thought should be considered "not at all automatic" if the participant consciously tried to have it, whereas a thought should be "entirely automatic" if it just seemed to "pop" into his or her head. After 3 minutes had elapsed, participants were provided with the keywords and phrases they reported for each thought one at a time. As each appeared, they were asked to rate how pleasant and unpleasant each thought was using separate 7-point unipolar scales ranging from "not at all" to "entirely." They were also asked to indicate whether each thought pertained to the favorite activity they named at the very beginning of the study.

Last, participants completed the Passion Scale and provided basic demographic information including age, gender, and ethnicity. They then read a debriefing statement that explained the purpose of the study.

Analytic Methods

SPSS Statistics 22 was used to conduct preliminary and primary analyses in this study. Per software default, missing data (e.g., items left unanswered by participants) were processed using listwise deletion.

Results

Descriptive statistics

Typical activities participants reported as passions included reading, cooking, and cycling. See Table 4 for descriptive statistics on reported thoughts and scores on the Passion Scale by condition.

Table 4

Descriptive statistics for key variables in Study 2

Variable	Condition	<i>n</i>	<i>M</i>	<i>SE</i>	95% CI	
					Upper	Lower
Total thoughts	Control	37	10.46	1.029	8.37	12.55
	Harmonious	32	11.31	1.178	8.91	13.72
	Obsessive	27	12.48	1.844	8.69	16.27
Total thoughts about the passion	Control	37	2.84	0.877	1.06	4.62
	Harmonious	32	3.09	0.567	1.94	4.25
	Obsessive	27	3.15	0.830	1.44	4.85
Positivity of thoughts about one's passion	Control	20	4.90	0.373	4.12	5.68
	Harmonious	24	5.44	0.259	4.91	5.98
	Obsessive	19	4.11	0.464	3.14	5.09
	Control	36	4.02	0.094	3.83	4.21

Harmonious Passion (subscale score)	Harmonious	30	4.25	0.109	4.02	4.47
	Obsessive	26	3.90	0.148	3.60	4.21
	Control	36	3.01	0.155	2.69	3.32
Obsessive Passion (subscale score)	Harmonious	30	3.23	0.158	2.91	3.55
	Obsessive	26	3.27	0.147	2.97	3.57

Note: The lower sample sizes for the variable representing average positivity of the automatic thoughts participants reported about their passion is attributable to the fact that mean scores could not be calculated for the instances where participants indicated that none of their thoughts during the task pertained to their favorite activity.

Preliminary analyses

To test whether the manipulation succeeded, I submitted harmonious and obsessive subscale scores from the Passion Scale to a multivariate analysis of variance. Planned contrasts revealed that there were no differences across groups in terms of obsessive passion ($ps > .242$). However, participants assigned to the harmonious passion condition did subsequently rate their favorite activity as more harmonious than participants assigned to the obsessive passion condition ($p = .046$). Although the control group did not differ from either experimental group in terms of harmonious passion, ($ps > .156$), the means were in the expected direction. Taken together, these analyses suggest that the manipulation was ultimately successful.

Prior to testing my hypotheses, I examined the average automaticity ratings participants reported for the thoughts participants listed to confirm that I had a reasonable sampling of thoughts perceived to be spontaneous. I computed average automaticity scores for each person and calculated descriptive statistics on those scores. The average mean was 4.038 ($SE = 0.077$, 95% CI [3.885, 4.192]), which is on the high end of the 5-point scale. Further, no participants endorsed the lowest option (i.e., “not at all automatic”). Collectively, these markers suggest that the thoughts in my sample tended to be quite spontaneous.

Primary analyses

To test my prediction that participants in both passion conditions would report more frequent automatic thoughts about their favorite activity than participants in the control groups, I first calculated a ratio for each participant that corresponded to the number of thoughts about their favorite activity relative to the total number of thoughts reported. These scores were submitted to a one-way ANOVA with two planned contrasts: one comparing the control group to both passion groups, and the other comparing the two passion groups to one another. The first contrast revealed a marginally significant difference between the control group ($M = 0.203$, $SE = 0.047$, 95% CI [0.109, 0.297]) and the two experimental groups, $t(73.2) = -1.766$, $p = 0.082$, such that participants in the control group reported less frequent thoughts about their passions than participants in the obsessive ($M = 0.343$, $SE = 0.071$, 95% CI [0.198, 0.487]) or harmonious ($M = 0.358$, $SE = 0.119$, 95% CI [0.114, 0.601]) groups. Also consistent with my prediction, the second contrast revealed no differences in thought frequency between the harmonious and obsessive conditions, $t(43.2) = -0.109$, $p = .914$.

To test my hypothesis that, relative to those in the obsessive condition, participants in the harmonious condition would report more pleasant automatic thoughts about their favorite activity, I first computed the mean pleasantness rating across all thoughts about their favorite activity. I then submitted these scores to a one-way ANOVA with a planned contrast comparing the two experimental groups. The planned contrast yielded results consistent with my prediction: participants in the harmonious condition rated their automatic thoughts about their favorite activities as more pleasant ($M = 5.443$, $SE = 0.260$, 95% CI [4.907, 5.979]) relative to those in the obsessive condition ($M = 4.113$, $SE = 0.463$, 95% CI [3.139, 5.087]), $t(28.8) = 2.50$, $p < 0.018$. Post-hoc LSD tests revealed that the control group ($M = 4.898$, $SE = 0.373$, 95% CI [4.118, 5.677]) did not differ from either experimental group.

Discussion

Study 2 extended the results of Study 1 by experimentally manipulating passion type and measuring actual thoughts as they occurred. Consistent with my hypotheses and prior data, I found that participants in both passion conditions reported more frequent automatic thoughts about their favorite activity than participants in the control condition. As predicted, passion type did not predict overall thought frequency. In addition, as hypothesized, participants in the harmonious-passion condition reported that their thoughts about their favorite activity were on average more pleasant than those reported by participants in the obsessive-passion condition.

Though these findings are consistent with data obtained via other measures, it is important to consider two key limitations to their interpretation. First, the writing manipulation seemed to affect properties of harmonious but not obsessive passions, so observed differences across conditions can only be attributed to differences in harmonious features. Further, the nature of the control group, though informative, precludes certain inferences, given that it consisted of individuals who were indeed passionate about an activity. However, that passion was not made more salient by the 3-minute writing task, as it had been for participants in the two experimental groups. Fair questions of how passions compare to nonpassions are therefore beyond the scope of Study 2.

STUDY 3

The results of Studies 1 and 2 illustrate that the valence of the spontaneous thoughts people perceive about their favorite activities depend on features of harmonious and obsessive passion, with positive automatic thoughts being closely associated with harmonious passions. The primary purpose of Study 3 was to explore how spontaneous thoughts are involved in the basic motivational processes underlying how people pursue their favorite activities. Following incentive-salience theory, I predicted that positive spontaneous thoughts would mediate the

effect of positive emotions during the activity (an index of liking) on the number of times participants engage in the activity during one week (a behavioral index of wanting). Relatedly, I predicted that positive spontaneous thoughts would mediate the effect of harmonious passion on behavior.

Methods

Participants

Participants included 93 adults recruited from the Chapel Hill community for a larger study on improving health. Among the 82 who provided demographic information, the average age was 48.88 ($SD = 8.32$, $Min = 35$, $Max = 64$), and 63% identified as female. Though the sample was predominantly Caucasian (75.6%), other ethnicities were represented (17.1% Black or African American, 6.1% Asian, 1.2% American Indian or Alaskan Native).

Procedures

Participants completed daily measures of physical activity across one week during the pre-testing phase of a larger study on health behaviors. Each day, participants indicated whether they engaged in any vigorous exercise (i.e., activities causing large increases in breathing and heart rate), moderate exercise (i.e., activities causing small increases in breathing and heart rate), or muscle-strengthening activities during the previous 24 hours. For each type of activity completed, participants subsequently indicated how positive and negative they felt during the activity with response options ranging from (0) Not at All to (4) Very.

On the third day of measurement, participants also completed the Passion Scale in reference to physical activity (using a 7-point Likert scale) as well two items about the automatic thoughts they tend to have about physical activity. The first measured how frequently they perceived automatic thoughts as in Studies 1 and 2, and the second asked participants to estimate

the percentage (0-100) of their typical automatic thoughts about physical activity that are positive.

Analytic Methods

To create an aggregate score for target behavior, I summed the instances of physical activity for each participant across the week. Likewise, I computed the average degree of positivity felt during each activity to create an aggregate score to index liking. To test my hypotheses concerning mediation, I used a bootstrapping procedure with 1000 resamples (indirect macro in SPSS v22; Preacher & Hayes, 2008), which creates confidence intervals for the effect of the mediator on the dependent variable. Confidence intervals that do not contain zero indicate statistical significance at the $p < 0.05$ level. Per software default, missing data (e.g., items left unanswered by participants) were processed using listwise deletion.

Results

Descriptive Statistics

See Table 5 for descriptive statistics on reported thoughts, physical activity, and scores on the Passion Scale by condition.

Table 5

Descriptive statistics for key variables in Study 3

Variable	n	<i>M</i>	<i>SE</i>	95% CI Lower	95% CI Upper
Harmonious Passion (subscale score)	84	4.333	0.170	3.993	4.672
Obsessive Passion (subscale score)	84	2.316	0.149	2.020	2.612
% Positivity in ATs (0-100)	87	70.792	3.160	64.510	77.074
Thought Frequency	89	3.360	0.128	3.110	3.610
Positivity during	79	2.588	0.962	2.396	2.779

activity					
Total instances of activity	92	5.402	0.445	4.518	6.287

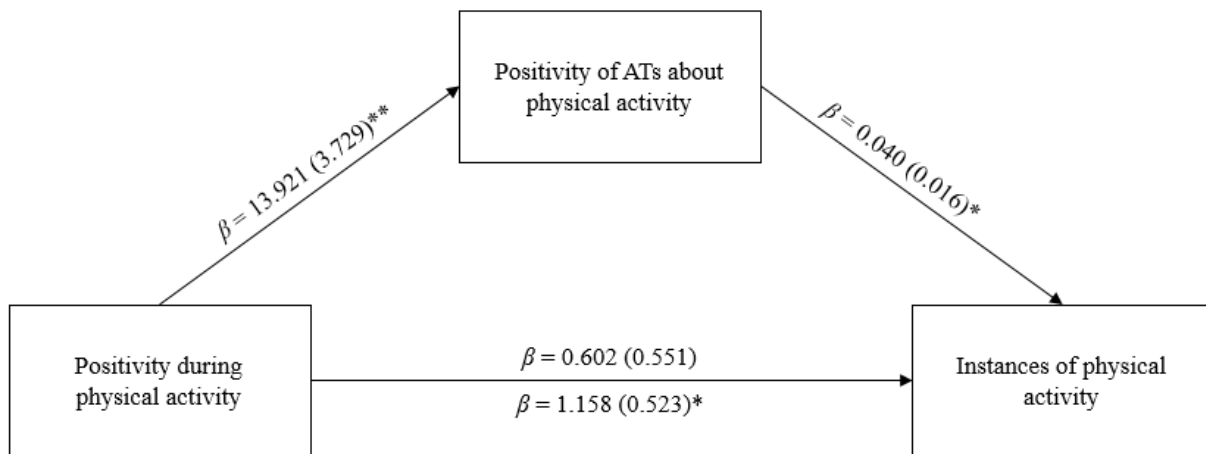
Note: The response anchors for the thought-frequency item ranged from “once a week or less” to “all the time,” with four points in between. A score of 3 corresponds to “almost every day.”

Primary Analyses

To test my first hypothesis, I created a mediation model with average positivity during physical activity (“liking”) as the independent variable, total instances of physical activity (“wanting”) as the dependent variable, and positivity of automatic thoughts as the mediator. Bootstrapping analysis revealed that the indirect effect was significant (unstandardized bootstrap estimate = 0.549, $SE = 0.253$, 95% CI [0.195, 1.271]); see Figure 1 for the path diagram with regression coefficients. In a similar model with thought frequency as the mediator, the indirect effect of liking on behavior through automatic thoughts was also significant (unstandardized bootstrap estimate = 0.419, $SE = 0.244$, 95% CI [0.075, 1.080]).

Figure 1

Positive automatic thoughts mediate the relationship between liking and wanting



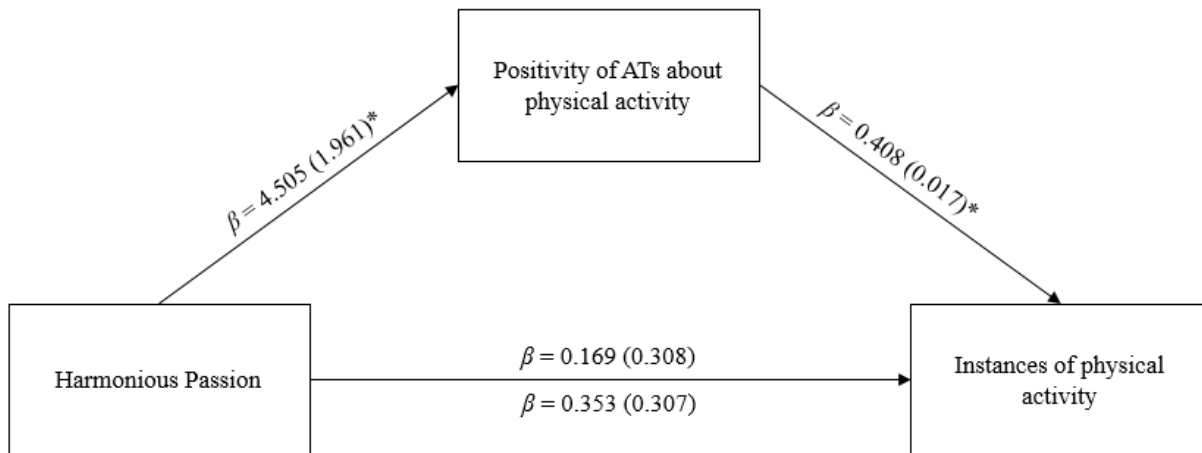
Note: * $p < .05$, ** $p < .001$; Standard errors are given in parentheses.

Additionally, I created a mediation model with harmonious passion as the independent variable, total instances of physical activity as the dependent variable, and positivity of automatic

thoughts as the mediator. Bootstrapping analysis revealed that the indirect effect was significant (unstandardized bootstrap estimate = 0.194, $SE = 0.101$, 95% CI [0.035, 0.441]), see Figure 2 for the path diagram with regression coefficients. The analogous model with thought frequency as the mediator also produced a significant indirect effect of harmonious passion on behavior through automatic thoughts (unstandardized bootstrap estimate = 0.250, $SE = 0.140$, 95% CI [0.064, 0.708]).

Figure 2

Positive automatic thoughts mediate the relationship between harmonious passion and wanting



Note: * $p < .05$, ** $p < .001$; Standard errors are given in parentheses.

Discussion

In Study 3, I uncovered evidence for the role positive automatic thoughts may play in motivation. Specifically, I predicted that spontaneous thoughts may be indicators of incentive salience, constituting one mechanism through which liking facilitates wanting. Consistent with this framework, positivity experienced during physical activity predicted automatic thoughts about physical activity that were both more frequent and more positive. Positive automatic thoughts in turn predicted more frequent instances of physical activity and mediated the relationship between positive emotions and behavior. Similarly, automatic thoughts mediated the

relationship between harmonious passion about physical activity and frequency of exercise behavior. Though these results provide insight into the function automatic thoughts may serve in motivation processes in general and the development of passions in particular, it remains to be seen how these factors unfold over time; the cross-sectional structure of the data is one limitation of Study 3. Evaluating the temporal dynamics of harmonious passion and automatic thoughts was the main focus of Studies 4 and 5.

STUDY 4

Studies 1 and 2 produced initial evidence of systematic differences in patterns of automatic thoughts across different types of passions, and Study 3 provided a first glimpse of how automatic thoughts facilitate wanting. The primary purpose of Study 4 was to extend this research to examine how nuances in thought patterns may impact the growth of passions over time by influencing the ways in which people pursue them. As such, Study 4 employed a repeated-measures design to test two primary hypotheses. First, I predicted that harmonious passion would be related to increasingly positive automatic thoughts about a favorite activity over time, whereas obsessive passion would be related to less positive automatic thoughts over time or unrelated to positivity in automatic thoughts. My second hypothesis was that positive emotions in automatic thoughts about a favorite activity would predict increases in harmonious passion over time.

Methods

Participants

Sixty nine UNC undergraduates enrolled in General Psychology (57 women, $M_{age} = 19.01$, $SD = 1.105$) completed the online study in exchange for partial course credit. Though the sample was predominantly Caucasian (71.0%), other ethnicities were represented (23.2% Black or African American, 4.3% Asian, 1.4% American Indian or Alaskan Native).

Procedures

The study involved completing a battery of nearly identical questionnaires at three time points that were distributed to participants at two-week intervals. Participants who provided informed consent began each questionnaire by naming their favorite activity. Then, participants completed the Passion Scale (Vallerand et al., 2003) and two items pertaining to properties of perceived automatic thoughts about the activity. More specifically, participants answered the thought frequency item from Study 1 (albeit with slightly modified response anchors), then provided an estimate of the percentage (0-100) of their automatic thoughts about that activity that were positive. In the final questionnaire, participants provided basic demographic information (i.e., age, gender, and ethnicity) and read a debriefing statement that explained the purpose of the study and the hypotheses.

Analytic Methods

SAS 9.3 was used to conduct the primary analyses and descriptive statistics in this study, and SPSS Statistics 22 was used to conduct demographic analyses. After evaluating descriptive statistics, I tested my primary hypotheses using multilevel modeling procedures (PROC MIXED) with restricted maximum likelihood (REML) estimation. Model building was entirely theory driven, and individual parameters were examined to determine significance at the level of $\alpha = 0.05$. Missing data (e.g., items left unanswered by participants) were processed using listwise deletion.

Results

Descriptive statistics

Typical favorite activities included swimming, singing, and soccer. See Table 6 for descriptive statistics pertaining to thought properties and scores on the Passion Scale.

Table 6

Descriptive statistics for key variables in Study 4

Variable	Time	<i>n</i>	<i>M</i>	<i>SD</i>	95% CI Lower	95% CI Upper
Harmonious Passion	1	99	3.997	0.063	3.872	4.122
	2	71	3.865	0.071	3.724	4.006
	3	69	3.783	0.086	3.611	3.954
Obsessive Passion	1	99	2.750	0.086	2.579	2.921
	2	71	2.794	0.095	2.606	2.984
	3	69	2.696	0.102	2.491	2.900
% Positivity in ATs	1	99	82.697	1.422	79.876	85.518
	2	71	82.408	2.081	78.258	86.559
	3	69	83.652	1.926	79.809	87.495
Thought Frequency	1	99	2.879	0.152	2.577	3.181
	2	71	3.113	0.187	2.704	3.485
	3	69	3.043	0.173	2.698	3.389

Note: The response anchors for the thought-frequency item ranged from “once a week or less” to “all the time,” with four points in between. A score of 3 corresponds to “almost every day.”

Primary Analyses

To test my hypothesis that positivity in automatic thoughts at a given time point would be positively related to harmonious – but not obsessive – passion two weeks later, I submitted the data to a hierarchical linear model with time points (level 1) nested within participants (level 2). In this residualized change model, I regressed harmonious passion at time $T + 1$ on thought positivity at time T and harmonious passion at time T ; as such, a significant beta for thought positivity would indicate that positivity in automatic thoughts predicts subsequent harmonious passion above and beyond previous levels of harmonious passion, which is computationally equivalent to saying that thought positivity predicts increases in harmonious passion. This is indeed what the model revealed: thought positivity predicted increases in harmonious passion over time ($\beta = 0.010$, $SE = 0.003$, $p < .001$). Also consistent with my predictions, thought

positivity was not related to changes over time in obsessive passion ($\beta = 0.003$, $SE = 0.004$, $p = .425$) when tested in a separate model.

To test the other half of the positive feedback loop between harmonious passion and thought positivity predicted by my second hypothesis, I constructed analogous models with thought positivity at time $T + 1$ regressed on harmonious passion at time T and thought positivity at time T . This model indicated that – consistent with my predictions – harmonious passion predicted increases in positivity of automatic thoughts about the activity over time ($\beta = 10.993$, $SE = 2.587$, $p < .001$), and the effect remained significant ($\beta = 12.674$, $SE = 2.934$, $p < .001$) when obsessive passion (which itself was not significant; $\beta = -2.376$, $SE = 1.972$, $p = .236$) was included in the model as a covariate. Also as predicted, obsessive passion was unrelated to changes in thought positivity over time ($\beta = 1.676$, $SE = 1.890$, $p = .381$), even when harmonious passion was not included in the model.

Discussion

In Study 4, I sought to extend the findings of Studies 1 and 2 by evaluating how the relationships between features of passions and the automatic thoughts about those passions play out over several weeks. Consistent with my predictions, higher levels of harmonious passion were associated with increases in thought positivity two weeks later, and the reverse direction was also true, such that greater positivity in automatic thoughts was associated with increases in harmonious passion over time. Critically, this pattern only held for harmonious passion; there were no such relations between obsessive passion and thought positivity. These results suggest that harmonious passion and positive automatic thoughts about that passion reinforce one another over time in positive feedback loop. This study did not, however, provide evidence for an analogous cycle between thought positivity and obsessive passion. Given the abundance of prior research that also failed to produce associations between obsessive passion and positive affect,

this null finding is not particularly surprising. Even so, it remains unclear whether obsessive passion is related to relatively *negative* automatic thoughts about the activity in question (negativity was not measured in the current study) or whether the external contingencies tied to obsessive passion may displace automatic thoughts as a driving force underlying the way those passions are pursued and developed over time. Exploring this question was a primary focus of Study 5.

STUDY 5

The primary purpose of Study 5 was to investigate negative as well as positive affect in automatic thoughts. Further, Study 5 enabled me to explore positive automatic thoughts in the context of passion for a romantic relationship or partner. At least one previous study has explored how harmonious and obsessive passion for a romantic relationship is associated with the quality of that relationship (Ratelle et al., 2013), yet my focus was once again on more fundamental affective processes. As in Study 4, I predicted that harmonious passion and positive automatic thoughts would promote one another over time in an upward spiral dynamic, which would replicate the effect of Study 4 in a distinct context. Additionally, I hypothesized that there would be no analogous spiral between obsessive passion and negative automatic thoughts, further clarifying the divergent processes by which harmonious and obsessive passions operate. Though a downward spiral between obsessive passion and negative thoughts is certainly plausible, the results of my previous studies suggest that in the case of obsessive passions, automatic thoughts may not be a key driving factor.

Methods

Participants

One hundred seven UNC undergraduates enrolled in General Psychology (72 women; $M_{age} = 18.505$, $SD = 1.040$) completed the online study in exchange for partial course credit.

Though the sample was predominantly Caucasian (71.0%), other ethnicities were represented (12.2% Black or African American, 11.2% Asian, etc.).

Procedures

Participants completed a battery of nearly identical questionnaires at three time points, distributed at four-week intervals. Participants who provided informed consent began each questionnaire by naming their significant other (or crush if they were not currently in a relationship) and then completing the thought-frequency measure from Study 1. In addition, they reported the extent to which their typical automatic thoughts about the identified person involved each of 20 triads of discrete emotions taken from the Modified Differential Emotion Scale (Fredrickson, 2013). Next, participants completed the Passion Scale, modified so that the items referred to passion for the relationship or significant other rather than an activity (as in Ratelle et al., 2013). In the final questionnaire, participants provided basic demographic information (e.g., age, gender, and ethnicity) and read a debriefing statement that explained the purpose of the study and the methods it employed.

Analytic Methods

SAS 9.3 was used to conduct all analyses in this study. After evaluating descriptive statistics, I tested my primary hypotheses using multilevel modeling procedures (PROC MIXED) with restricted maximum likelihood (REML) estimation. Model building was entirely theory driven, and individual parameters were examined to determine significance at the level of $\alpha = 0.05$. Missing data (e.g., items left unanswered by participants) were processed using listwise deletion.

Results

Descriptive Statistics

See Table 7 for descriptive statistics pertaining to passion scores and properties of automatic thoughts.

Table 7

Descriptive statistics for key variables in Study 5

Variable	Time	<i>n</i>	<i>M</i>	<i>SE</i>	95% <i>CI</i> <i>Lower</i>	95% <i>CI</i> <i>Upper</i>
Harmonious Passion	1	90	5.087	0.126	4.837	5.337
	2	75	5.084	0.156	4.773	5.396
	3	63	5.011	0.184	4.643	5.378
Obsessive Passion	1	90	3.383	0.136	3.113	3.652
	2	75	3.099	0.165	2.770	3.428
	3	63	3.095	0.206	2.681	3.510
Positive Emotions in ATs	1	90	3.447	0.094	3.260	3.633
	2	76	3.352	0.118	3.116	3.588
	3	64	3.369	0.137	3.094	3.643
Thought Frequency	1	89	3.865	0.107	3.652	4.079
	2	76	3.723	0.122	3.480	3.967
	3	64	3.578	0.147	3.284	3.873

Note: The response anchors for the thought-frequency item ranged from “once a week or less” to “all the time,” with four points in between. A score of 3 corresponds to “almost every day,” and a score of 4 corresponds to “2-3 times per day.”

Primary Analyses

As in Study 4, I used hierarchical linear modeling to map changes in harmonious or obsessive passion and thought properties over time. First, I regressed harmonious passion at time $T + 1$ on thought positivity (an average score of the positive-emotion items from the Modified Differential Emotion Scale) at time T and harmonious passion at time T . The residualized-change model indicated that again, greater thought positivity predicted increases in harmonious passion four weeks later ($\beta = 0.300$, $SE = 0.138$, $p = .034$), and also as in Study 4, when obsessive passion at time T was used as a predictor, no association emerged between thought positivity and

change over time in obsessive passion ($\beta = 0.102$, $SE = 0.121$, $p = .401$). Further, the same pattern of results emerged on the reciprocal side of the cycle; greater harmonious passion predicted increases over time in thought positivity ($\beta = 0.272$, $SE = 0.077$, $p < .001$), but no association emerged between obsessive passion and changes over time in thought positivity ($\beta = 0.099$, $SE = 0.061$, $p = .109$). This overarching pattern held when both types of passion were entered in the model as simultaneous predictors of change in thought positivity: $\beta_{HP} = 0.256$, $SE_{HP} = 0.080$, $p = .002$; $\beta_{OP} = 0.045$, $SE_{OP} = 0.061$, $p = .466$.

To test my second hypothesis, I explored patterns of negativity in automatic thoughts (indexed as an average score of the negative-emotion items from the Modified Differential Emotion Scale) in relation to harmonious and obsessive passion over time. Using analogous models to those created to test hypothesis 1, I found that negative automatic thoughts about a significant other were unrelated to changes in harmonious ($\beta = -0.231$, $SE = 0.177$, $p = .198$) and obsessive passion ($\beta = -0.002$, $SE = 0.174$, $p = .990$). Regarding the other direction of the cycle, although harmonious passion was unrelated to changes in thought negativity over time ($\beta = 0.057$, $SE = 0.039$, $p = .150$), obsessive passion predicted increases in thought negativity over four weeks ($\beta = 0.068$, $SE = 0.033$, $p = .041$). However, when both types of passion were included as predictors of change in thought negativity over time, neither was significant ($\beta_{HP} = 0.019$, $SE_{HP} = 0.046$, $p = .672$; $\beta_{OP} = 0.060$, $SE_{OP} = 0.039$, $p = .129$).

Discussion

In Study 5, I replicated the cyclical effect by which harmonious passion and positive automatic thoughts reinforce one another over time and once again found no evidence of such a relationship between obsessive passion and positive automatic thoughts. Further, I explored whether negative automatic thoughts were related to changes in harmonious and obsessive passion over time and found no reciprocal relationships. Collectively, these patterns of results are

consistent with my hypotheses about the dynamics of positive automatic thoughts within harmonious passions and also with previous work on the general affective experiences associated with harmonious and obsessive passions.

GENERAL DISCUSSION

Across five studies, I have demonstrated that automatic thoughts about one's favorite activity or person seem to vary depending on the specific features of the passion (i.e., whether it is more or less harmonious and obsessive), and those thoughts in turn predict changes over time in the nature of the passion itself. Specifically, I found in Studies 1 and 2 that being more passionate about an activity was associated with more frequent automatic thoughts about the activity, with both harmonious and obsessive features independently predicting greater thought frequency. In those same studies, I also found support for my hypothesis that harmonious passion would be associated with automatic thoughts that were more positive than those associated with obsessive passion. Study 3 revealed a mediating role of positive automatic thoughts in the relationship between positive emotions during an activity ("liking") and frequency of behavior ("wanting"). In Studies 4 and 5, I explored the temporal nature of these relationships and found that more positive automatic thoughts were associated with increases across several weeks in harmonious passion and also that more harmonious passion was associated with increases over the same time span in the positivity of one's automatic thoughts about their favorite activity. Notably, no similar reciprocal relations emerged between obsessive passion and positive automatic thoughts in either direction. In Study 5, I also found the association between automatic thoughts and harmonious passion to be specific to positivity; no such association emerged between negative automatic thoughts and either type of passion.

Given that passions are such substantial parts of people's lives – both in terms of identity and investment of time and effort – it is not surprising that they generate spontaneous thoughts

more frequently than comparable activities about which people are not passionate. What may be more surprising, however, is that harmonious passions produce automatic thoughts as least as frequently as – if not more than – obsessive passions, considering how obsessions may be characterized as always being on one’s mind. One interpretation of this finding may be that whereas the pursuit of obsessive passions is controlled at least in part by external contingencies, the pursuit of harmonious passions, which have been found to lack such contingencies, is more often governed by the ordinary and automatic products of a well-functioning positive emotion system.

In the present studies, I uncovered evidence of a reciprocal relationship between harmonious – but not obsessive – passion and positive automatic thoughts that unfolds over time. In this cycle, people who reported greater positivity in the thoughts that popped to mind about their favorite activity showed increases several weeks later in the harmonious qualities of their passion for that activity, and in turn, their greater harmonious passion predicted having increasingly frequent positive automatic thoughts about the passion. I speculate that these two variables provide but a glimpse into a more complex dynamic processes underlying harmonious passions. Future research, for instance, might test whether positivity in automatic thoughts broadens cognitions (per the broaden-and-build theory; Fredrickson, 1998; 2001; 2013) in ways that enable people to pursue their passions flexibly, promoting harmony between the favorite activity and other life domains. Likewise, the positive affect encountered during and after engaging in the activity (Vallerand et al., 2003) may imbue the concept of the passion with positivity, increasing the pleasantness of subsequent thoughts about it. Additionally, further research aimed at identifying mediators of these processes might evaluate the role of processes related to implicit attitudes.

Given the human mind's entrenched bias toward negative material, it follows that, relative to their negative counterparts, positive automatic thoughts likely capture less attention. They have certainly captured less attention among empirical researchers, as the studies reported here are among the first attempts to measure positive automatic thoughts in a normative context. In breaking new ground, the current studies are subject to several methodological limitations, although I attempted to diminish the impact of these by employing a range of measures and empirical approaches. For example, though I relied on self-reported data regarding thought frequency and positivity (to be fair, it remains difficult to determine what people are thinking about without asking them) in Study 1, I crafted my items to be straightforward and simple to answer. The comparable measures I used in Studies 3-5 while still quite simple, captured positivity in distinct ways (e.g., rating discrete positive emotions in typical automatic thoughts versus estimating the percent positivity in typical automatic thoughts versus simply indicating whether thoughts tended to be mostly or entirely positive, negative, neutral, or mixed). Moreover, in Study 2, I captured participants' specific thoughts in real time during a lab session using a thought-listing protocol, and those data were comparable to the data obtained using less intensive measures.

The present research extends existing theoretical and methodological conventions concerning incentive salience. Study 3 revealed that positive automatic thoughts about physical activity mediated the relationship between liking the activity and engaging in it repeatedly. Though the current data do not illustrate the mechanism by which positive automatic thoughts translate to increased behavior, it could be the case that consciously perceiving positive thoughts about the activity in question focuses the individual on the desired outcome and actions they may take to achieve it. Further research should explore the specific nature of this motivational role of positive automatic thoughts. The results of Study 3 suggest not only that automatic thoughts are

one mechanism by which incentive salience facilitates behavior, but also that they may be measured as an index of heightened salience of desired outcomes or associated cues. As such, subsequent research may make use of automatic thoughts as indicators of incentive salience, especially given that they are relatively quick and easy to measure.

Passions are important factors in people's everyday lives and ample past research has shown that they have measurable implications for general well-being, not to mention the more momentary satisfaction they may provide. Across five studies, I have identified positive automatic thoughts as a key ingredient that promotes the development of more harmonious passions in a reciprocal dynamic that resembles an upward spiral. Though future studies should aim to uncover other hidden dynamics that knit harmonious passions into the fabric of people's lives, the reciprocal relationship between spontaneous positive thoughts and harmonious passions reported herein may illuminate one aspect of the upward spiral theory of lifestyle change (Fredrickson, 2013). This theory posits that to the extent that wellness behaviors like physical activity or eating healthful foods (and which may conceivably develop into harmonious passions) promote positive emotions (Reed & Buck, 2009; White, Horwath, & Conner, 2013), those positive emotions both imbue the concept of the behavior (and related cues, such as the sight of one's own workout gear or the local farmer's market) with nonconscious incentive salience and facilitate cognitive broadening. Incentive salience in turn motivates repeated wellness behaviors, and the broadened mindset facilitates the development of resources that may in turn serve to increase the positive emotion yield of subsequent wellness behaviors. In the context of the present research, positive automatic thoughts may be one manifestation of the incentive salience that drives repeated engagement and the development of resources, which may include an improved ability to flexibly (i.e., harmoniously) incorporate the activity into one's life.

One of the larger questions surrounding positive automatic thoughts concerns whether and how they may be used strategically. Given that by definition, these thoughts arise without conscious intention, it may be that seeking to arouse them may fundamentally change their nature. My findings from Study 3 in particular suggest that a subtler way to facilitate these cognitions is to increase the positive emotions experienced during the activity. Likewise, as demonstrated in Study 2 (and in previous research, Bélanger et al., 2013), even momentarily reappraising one's passion as more harmonious seems sufficient to alter spontaneous thoughts about the activity. Future research should explore other avenues for facilitating these cognitions.

Positive spontaneous thoughts are normative occurrences in everyday life, though they may not typically demand attention the way their less pleasant counterparts. Despite perhaps seeming somewhat less consequential, positive spontaneous thoughts appear to be a key factor related to the development of passions and may shape the way people pursue their favorite activities and important relationships. Future research should continue to explore the basic psychological processes that keep people's favorite activities and others always on their minds.

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