



# Anticipatory and consummatory components of the experience of pleasure: A scale development study

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## Abstract

The Temporal Experience of Pleasure Scale (TEPS) was designed to measure individual trait dispositions in both anticipatory and consummatory experiences of pleasure. From an initial pool of theory-based items, we developed a 10-item anticipatory pleasure scale and an 8-item consummatory pleasure scale using several large college-age samples; the two scales were both internally consistent and temporally stable. As expected, these two scales were moderately, positively correlated with each other. Examination of convergent and discriminant validity indicated that the two scales measured distinct and specific constructs. In particular the anticipatory scale was related to reward responsiveness and imagery, while consummatory pleasure was related to openness to different experiences, and appreciation of positive stimuli. Potential applications of the TEPS, particularly in psychopathology research, are discussed.

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**1. In terms of real life, most pleasure may come from memory or anticipation, as opposed to online experience (Rozin, 1999, p. 113)**

Though the above quote may be true, most psychological research on the experience of positive emotion or pleasure has focused on “in-the-moment,” or online experience in response to a specific stimulus (e.g., film clips, emotion inducing slides, foods, or drinks). In other words, most research has been done on *consummatory* pleasure. Though this has provided considerable understanding about normative dispositional experiences in response to positive or pleasurable stimuli, it has not informed our understanding of anticipatory pleasurable experiences. Although to date there is a dearth of research specifically examining normative dispositional experiences of anticipatory pleasure in humans, research from neuroscience, social psychology, and clinical psychology provides support for anticipatory and consummatory pleasure as distinct processes.

Klein (1984) succinctly highlighted the distinction between anticipatory and consummatory pleasure in a theoretical paper on anhedonia (i.e., diminished capacity to experience pleasure) in depression. He argued that anticipatory pleasure is more closely linked to motivation and goal-directed behavior, leading one to have the experience of wanting more, and that consummatory pleasure is more closely linked to satiation, or a resolution of desire. Furthermore, he made the case that distinguishing between anticipatory and consummatory pleasure was central to the understanding and treatment of the symptom of anhedonia in depression.

This distinction between anticipatory and consummatory pleasure has also been borne out in recent neuroscience studies on reward. Using animal models, Berridge and Robinson have made clear distinctions between the neural underpinnings of ‘wanting’ versus ‘liking.’ In their conceptualization, wanting refers to (among other things) the conscious experience of desire, or as we have termed it here, anticipatory pleasure, whereas liking refers to the conscious in-the-moment experience of pleasure, or the hedonic impact of the desired stimulus. Other evidence indicates that the neurotransmitter dopamine, once thought to be the neural equivalent of the online experience of pleasure (Wise, 1982), is instead important for the *anticipatory* but not the consummatory experience of pleasurable stimuli (see Berridge & Robinson, 2003, 1998, for a review). In human studies using functional neuroimaging (fMRI), researchers have found a dissociation of brain activation during the anticipation of reward (activation of the nucleus accumbens, but not the pre-frontal cortex) relative to the consumption of a reward (activation of the pre-frontal cortex, but not the nucleus accumbens) (e.g., Knutson, Adams, Fong, & Hommer, 2001; but see Ernst et al., 2004).

Researchers have also asserted the importance of anticipatory pleasure in relation to personality. In particular, Depue and colleagues (e.g., Depue & Collins, 1999; Morrone-Strupinsky & Depue, 2004) have noted the centrality of anticipatory pleasure, or how they have termed it, ‘positive incentive motivation,’ in extraversion. They argued that individual differences in extraversion may be related, in part, to individual differences in the functioning of the dopaminergic system, particularly in the ventral tegmental area from which numerous projections lead to the nucleus accumbens. This area is thought to be crucial in terms of its relationship between the experience of pleasure and goal-directed behavior (Berridge & Robinson, 1998; Depue & Collins, 1999). In other words, individual differences in personality facets such as extraversion may be related to, or driven by, what we are terming here anticipatory pleasure.

Social psychologists have also differentiated the role of anticipatory pleasure (also termed ‘wanting’ in this literature) from consummatory pleasure (or ‘liking’). They have found numerous discrepancies between what individuals report feeling as they ‘want’ something and what individuals report feeling when they actually get what it is they wanted (e.g., Gilbert & Wilson, 2000; Kahneman & Snell, 1992). Findings from a number of studies have shown that individuals are poor at predicting enjoyment in the distant future (Kahneman & Snell, 1992), they focus on *getting* what they want as opposed to *having* what they want (Schkade & Kahneman, 1998), and this focus strongly influences motivation to seek out a desired end (e.g., Freitas, Liberman, & Salovey, 2002; Higgins, 2000). One compelling interpretation of these findings is that discrepancies in wanting (or anticipatory pleasure) versus liking may be providing a powerful motivating factor that pushes people to go after specific stimuli or experiences (Elster & Loewenstein, 1992; Freitas & Higgins, 2002; Kahneman, Wakker, & Sarin, 1997).

Finally, the distinction between anticipatory and consummatory pleasure has also captured the attention of psychopathology researchers—particularly with respect to disorders such as schizophrenia and depression. For example, studies have shown that schizophrenia patients are less active or engaged in positive or enjoyable activities than nonpatients (e.g., Miller, 1987) and score high on self-report scales measuring anhedonia (e.g., Chapman, Chapman, & Raulin, 1976). However, laboratory studies that measure patients’ consummatory (or in the moment) experience of positive or pleasurable stimuli have not found that patients experience less positive emotion than nonpatients (e.g., Berenbaum & Oltmanns, 1992). One possible explanation for these differences in findings may be that schizophrenia patients have an anticipatory but not consummatory deficit in the experience of pleasure (Kring, 1999). Supporting this notion, findings from an experience sampling study found that schizophrenia patients reported the same amount of consummatory enjoyment as nonpatients but reported anticipating less enjoyment for future activities (Gard, Kring, Germans, & Werner, 2000).

In sum, accumulated evidence across disciplines suggests that anticipatory pleasure can be differentiated from consummatory pleasure. This differentiation may be to facilitate the engagement of motivational processes. In other words, it may be that anticipatory pleasure (or wanting) is what activates motivational processes, which subsequently encourages the individual to seek out a particular stimulus to experience pleasure from it. In order for empirical findings on trait experiences of positive or pleasurable stimuli (consummatory pleasure) to have ecological validity, it is important that we understand the processes, such as anticipation, that get us there, and which may have an impact on what ultimately is experienced.

To be clear, we distinguish anticipatory pleasure from similar constructs such as approach motivation (for example) in that anticipatory pleasure is thought to involve the pleasure experienced in anticipation and the ability to image a stimulus (Berridge & Robinson, 2003). Approach motivation on the other hand is more related to drive, fun seeking and reward responsiveness (e.g., Carver & White, 1994). There are likely trait individual differences in anticipatory and consummatory pleasure in the same way that individual differences have been posited in the overall experience of pleasure (Meehl, 1975). The focus of the present study therefore is on the development of a paper and pencil measure of trait anticipatory and trait consummatory pleasure to distinguish these two temporal components of the experience of pleasure.

## 2. Study 1: Factor analysis, scale construction, and group differences

### 2.1. Scale development

We followed a deductive rational strategy as suggested by [Burisch \(1984\)](#) and [Jackson \(1970\)](#) in designing the Temporal Experience of Pleasure Scale (TEPS). Specific items were developed according to theoretical models of anticipatory and consummatory pleasure (e.g., [Berridge & Robinson, 1998](#); [Depue & Collins, 1999](#); [Klein, 1984](#)). Items written to tap anticipatory pleasure reflected the pleasure experienced in anticipation of a positive or pleasurable stimulus. Items written to tap consummatory pleasure reflected the online, in-the-moment pleasure in response to a stimulus. Items conveyed both specific (e.g., ‘I appreciate the beauty of a fresh snowfall.’) and general (e.g., ‘I look forward to a lot of things in my life.’) situations that included all five sensory modalities. In creating these items, we were careful not to choose items that were specific to any cultural or socioeconomic group. Though pleasures related to social, intellectual, and achievement domains are all important areas of experience, we decided to focus on physical pleasure to have a relatively homogeneous set of items measuring one construct (e.g., [Briggs & Cheek, 1986](#)). Furthermore, physical pleasure is something that all people experience, regardless of ethnicity, culture, or socioeconomic status and therefore seemed to be a good basis from which to initially examine an anticipatory/consummatory distinction.

From this definition of anticipatory and consummatory pleasure, we developed a pool of over 250 potential TEPS items, which were reviewed for redundancy and cultural and class specificity (e.g., “I enjoy a nice glass of Chardonnay” was believed to be class or culturally specific), resulting in a pool of 103 items. From these items, three independent judges rated whether each of the entire list of items was an ‘anticipatory’ or ‘consummatory’ pleasure item. Eight items were discrepant in the judges’ ratings and were therefore excluded. The response format for the remaining 95-item scale was a 6-point Likert scale (1 = *very false for me* to 6 = *very true for me*).

Our main hypothesis in this study was that trait dispositions to experience anticipatory pleasure could be distinguished from trait dispositions to experience consummatory (or online) pleasure. We expected anticipatory and consummatory pleasure experiences to be moderately positively correlated since they are both part of the larger construct of pleasure experience. However, since we believed that these experiences were nonetheless distinct, we set out to test this hypothesis by designing a scale that included both of these experiences and that could be subsequently factor analyzed to see if participants viewed these experiences as distinct, ultimately resulting in two distinct scales.<sup>1</sup>

Previous self-report measures, especially in the realm of emotion, have indicated that women tend to score higher on many emotion-related scales. Among the many differences, women recall more positive and negative memories as well as more vivid details related to positive and negative events ([Seidlitz & Diener, 1998](#)), report expressing more positive and

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<sup>1</sup> It should be noted that our main hypothesis makes the assumption that because research indicates there are distinctions in the neural pathways that are involved with anticipatory and consummatory pleasure, these distinctions should also involve distinct experiential differences. Of course, not all neurally distinct processes will result in distinct experiences (and it may not be the case that all distinct experiences will have distinguishable neural pathways). However, in this case we are also drawing on research in psychopathology and social psychology that indicates that these processes are indeed experientially distinct.

Table 1  
Summary of samples in Study 1 and 2

Sample characteristics	Sample				Miami (validation) E
	Berkeley <sup>a</sup>				
	A	B	C	D	
Sample size	100	1035	146	351	755
Mean age (years)	22.9	20.2	21.7	22.2	<sup>b</sup>
Ethnicity					
% Women	78	64.3	60.3	63	64.5
% African American	6	2.3	5.2	5.8	<sup>b</sup>
% Asian American	54	40.4	39.7	41.2	<sup>b</sup>
% European American	29	37.5	38.4	39.8	<sup>b</sup>
% Latino	7	7	9.2	9.9	<sup>b</sup>

<sup>a</sup> Note. There were no significant differences in terms of age, gender or ethnicity in samples A–D.

<sup>b</sup> Note. The age and ethnicity data were not available for the University of Miami sample.

negative emotions (Gross & John, 1995), and report higher trait reward responsiveness (Carver & White, 1994). Given that both scales of the TEPS require one to recall experiences with pleasurable stimuli, we predicted that women would score higher on both scales of the TEPS.

## 2.2. Method

### 2.2.1. Participants

Four samples were used in the scale construction. Samples A–D were undergraduate psychology students from the University of California at Berkeley. Sample A was used to determine whether the vast majority of participants had experienced the content of each item. This sample consisted of 72 women and 28 men ( $M$  age = 22.85 years,  $SD$  = 7.21). These participants also completed several additional questionnaires (described below in Study 2) selected to provide convergent and discriminant validity. Sample B served as the derivation sample and consisted of 665 women and 369 men ( $M$  age of 20.17 years,  $SD$  = 3.21). Sample C consisted of 88 women and 58 men ( $M$  age of 22.42 years,  $SD$  = 4.54) from sample B who completed the TEPS 5–7 weeks later to assess test–retest reliability. These participants also completed several additional questionnaires selected to provide convergent and discriminant validity (see Study 2 below). The ethnic composition of the samples (including sample D below) approximated that of the larger UC Berkeley student population (see Table 1). Samples A–D did not differ in age, gender or ethnicity. Sample E consisted of 487 women and 268 men (age and ethnicity were not collected in this sample) undergraduate psychology students from the University of Miami, used to validate the factor structure of the TEPS. All participants received course credit for their participation.

### 2.2.2. Measures and procedures

Participants completed the TEPS with the following instructions: “Below you will find a list of statements that may or may not be true for you. Please read each statement carefully and decide how true that statement is for you in general. Please respond to all items.” Only sample A had the additional instruction: “Choose ‘not applicable’ only if you have never had the described experience.”

## 2.3. Results and discussion

### 2.3.1. Overview

Our analyses were designed to assess five questions: (a) Are these items widely experienced by participants? (b) Is there a general ‘pleasure’ factor that emerges? (c) Are there specific subfactors which emerge—and if so, do these subfactors align with anticipatory and consummatory components of the experience of pleasure? (d) If there is a general pleasure factor that emerges and this factor splits into clearly identifiable anticipatory and consummatory subfactors, can this be replicated in a different sample? (e) Are there sex differences in the reported experience of pleasure?

### 2.3.2. Are these items widely experienced by participants?

From sample A, an analysis of the 95 items revealed that very few items were reported as having ‘never been experienced.’ Specifically 75% of the items were experienced by 97% or more of the sample. Seven of the 95 items stood out with more than 20% of the sample reporting never had that experience (these items were generally around topics of sex, smoking, sports, or pets). These items were deleted from further analyses, leaving an item pool of 88 items.

### 2.3.3. Is there a general pleasure factor with specific subfactors?

This question was addressed using sample B. To create a scale that reflected a diversity of response, all items with a mean of  $>4.75$  (from the 6-point Likert scale: 1 = *very false for me* to 6 = *very true for me*) were discarded. This left a total of 35 items (20 anticipatory and 15 consummatory). Seven of these items (3 anticipatory and 4 consummatory) were deleted as they had item-total and item-(hypothesized) scale correlations less than .30 (Cronbach, 1951). Finally, 5 items (3 anticipatory and 2 consummatory) were deleted from the scale because their item content was redundant with that of other items (e.g., “The smell of freshly cut grass is enjoyable to me” and “I enjoy the smell of trees and grass after it rains.”). In this case, the item with the higher mean (i.e., more negatively skewed) was discarded. The remaining 23 items were all positively inter-correlated (mean inter-item correlations for total, anticipatory, and consummatory items, respectively:  $r_s = .18, .23, \text{ and } .24$ ) and internal consistency (Cronbach’s  $\alpha$ ) was .82 for this set of 23 items.

Next, a principal components factor analysis was completed on this 23-item scale. The high eigenvalue of the first unrotated factor (4.56) indicated a general factor, most likely reflecting a general pleasure factor. However, the scree plot revealed two distinct factors, accounting for 20.7 and 7.7% of the variance, respectively, supporting our hypothesis that separate anticipatory and consummatory factors would emerge. These two factors were extracted using VARIMAX rotation. Since we expected anticipatory pleasure to be correlated with consummatory pleasure, an oblique rotation using OBLIMIN was also completed but revealed an identical pattern as the VARIMAX rotation. Specifically, both rotations revealed an anticipatory pleasure factor and consummatory pleasure factor, with one factor being comprised only of anticipatory items and one factor being comprised only of consummatory items (as judged earlier by independent raters). The emergence of distinct anticipatory and consummatory factors indicated that we were able to distinguish between these two pleasure facets. However, when we created two scales using all the items included in the factor analysis, these two scales were fairly highly correlated at  $r = .64$ . Given that our goal was to develop two scales that reliably measured two distinct facets of

pleasure, this correlation was too high. Therefore, we returned to the main pool of items and added in items that had means greater than 4.75 but that reliably distinguished between the two scales (i.e., items that correlated with their own scale greater than they correlated with the other scale) and to delete items that did not distinguish between the two scales or that loaded higher than .30 on the opposite scale.<sup>2</sup> This resulted in 7 new items added and 12 items removed, resulting in a group of 18 items total (10 anticipatory and 8 consummatory items).

This final grouping of items was subjected to a principal components factor analysis, and the first unrotated factor is shown in Table 2. Again the eigenvalue of the first unrotated factor was large (3.64), indicating a general factor. The average of the loadings of these 18 items on the first unrotated factor was .47. The highest loading items refer to pleasure experienced from food (e.g., ‘When I think about eating my favorite food, I can almost taste how good it is’) to other physical experiences of pleasure (e.g., ‘I enjoy taking a deep breath of fresh air when I walk outside’).

Following rotation with both VARIMAX and OBLIMIN (both yielding identical results), the scree plot of this final scale again indicted two distinct factors accounting for 22.7 and 9.2% of the variance, respectively. Table 3 shows the VARIMAX rotation of these anticipatory and consummatory factors. These findings provide evidence that from the self-report of these participants anticipatory and consummatory components of the experience of pleasure appear to be distinct facets of the experience of pleasure.

Since these scales may be used in psychopathology research (particularly in populations with the symptom of anhedonia), an additional analysis was done to look at participants that scored more than 2 standard deviations below the mean on the each of the two scales—a common way of determining anhedonic groups (e.g., Germans & Kring, 2000). Participants that scored in the ‘anhedonic’ range on the anticipatory scale and consummatory scale were compared. The overlap of these two groups was only 9.8%. That is, less than 10% of people who were anhedonic in anticipatory pleasure were anhedonic in consummatory pleasure, further indicating that the two scales (especially in terms of hedonic deficit) are measuring different facets of the experience of pleasure.

#### 2.3.4. Inter-correlations, $\alpha$ reliabilities, and test–retest reliability

The final 18 items were all positively inter-correlated with a mean inter-item correlation for total scale of  $r = .18$  and mean inter-item correlations for anticipatory and consummatory scales of  $r = .23$  and  $.24$ , respectively. These inter-item correlations for the two scales fall within the range recommended by Clark and Watson (1995). The total (or overall scale) and the anticipatory and consummatory scales showed good internal consistency (Cronbach’s  $\alpha$ —of .79, .74, and .71 for the total scale, anticipatory scale, and consummatory scale, respectively). The inter-correlation of the anticipatory and consummatory scales was moderate at .41. From the original derivation sample (sample B), 92 women and 61 men took the TEPS again 5–7 weeks later (mean = 6.32 weeks,  $SD = 1.25$ ). The test–retest reliabilities for the overall TEPS scale (TEPS-Total), the anticipatory scale (TEPS-ANT), and

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<sup>2</sup> We used the cut off of 4.75 to optimize the number of questions without creating a ceiling effect (where everyone reports the highest score possible). This could certainly be done with low standard deviations, and was also done with this group of questions as well, ultimately resulting in the same questions being eliminated (i.e., those questions with high means also had low standard deviations). We report means instead of standard deviations for ease of interpretation.

Table 2

Items in the final version of the Temporal Experience of Pleasure Scale—anticipatory pleasure scale (TEPS-ANT) and consummatory pleasure scale (TEPS-CON)

Original item No.	Loading on first unrotated factor	<i>M</i>	<i>SD</i>
3. When I think about eating my favorite food, I can almost taste how good it is	.59	4.41	1.27
17. When ordering something off the menu, I imagine how good it will taste	.57	4.43	1.21
16. I look forward to a lot of things in my life	.55	4.94	1.09
15. Looking forward to a pleasurable experience is in itself pleasurable	.55	4.56	1.15
2. The sound of crackling wood in the fireplace is very relaxing	.49	4.58	1.15
6. I enjoy taking a deep breath of fresh air when I walk outside	.49	4.77	1.09
14. When I think of something tasty, like a chocolate chip cookie, I have to have one	.49	3.56	1.41
13. I appreciate the beauty of a fresh snowfall	.48	4.91	1.18
10. I really enjoy the feeling of a good yawn	.47	4.24	1.30
12. I get so excited the night before a major holiday I can hardly sleep	.46	3.52	1.44
8. A hot cup of coffee or tea on a cold morning is very satisfying to me	.46	4.30	1.54
4. I love the sound of rain on the windows when I'm lying in my warm bed	.46	4.85	1.41
7. I don't look forward to things like eating out at restaurants (R)	.44	5.03	1.12
1. When something exciting is coming up in my life, I really look forward to it	.43	5.51	0.80
9. I love it when people play with my hair	.42	4.32	1.67
11. When I'm on my way to an amusement park, I can hardly wait to ride the roller coasters	.41	4.17	1.60
18. When I hear about a new movie starring my favorite actor, I can't wait to see it	.41	4.35	1.34
5. The smell of freshly cut grass is enjoyable to me	.38	3.42	1.50
Average loading	.48		

*Note.* Item numbers refer to the order that the items were listed in the scale. The response format was a 6-point Likert scale (1 = *very false for me* to 6 = *very true for me*). '(R)' indicates that the item is reverse coded. Values listed here are from the original derivation sample.

consummatory scale (TEPS-CON) were all high at  $r = .81$  ( $p < .001$ ),  $.80$  ( $p < .001$ ), and  $.75$  ( $p < .001$ ), respectively.

### 2.3.5. Are the general factor and subfactors replicable in a different sample?

After the TEPS scales were established, the TEPS was given to sample E, a group of undergraduates at the University of Miami. As with the derivation sample B, a principal components factor analysis was completed on the 18-item TEPS with sample E. Results of this factor analysis, listed in Table 3, were virtually identical to those seen in the derivation sample, with a clear distinction between anticipatory and consummatory factors. The high eigenvalue of the first unrotated factor (4.05) indicated a general factor, and the scree plot also revealed two distinct factors, accounting for 22.5 and 8.9% of the variance,

Table 3

Varimax rotated factor loadings of the Temporal Experience of Pleasure Scale (TEPS),  $\alpha$  reliabilities, and scale inter-correlations

Factors and items	Sample			
	Derivation		Validation	
	Anticipatory factor	Consummatory factor	Anticipatory factor	Consummatory factor
<b>Anticipatory factor</b>				
1. When something exciting is coming up in my life, I really look forward to it	.53	.05	.55	.27
3. When I think about eating my favorite food, I can almost taste how good it is	.61	.19	.67	.18
7. I don't look forward to things like eating out at restaurants (R)	.52	.07	.38	.07
11. When I'm on my way to an amusement park, I can hardly wait to ride the roller coasters	.44	.12	.43	.16
12. I get so excited the night before a major holiday I can hardly sleep	.48	.15	.45	.25
14. When I think of something tasty, like a chocolate chip cookie, I have to have one	.58	.07	.63	-.19
15. Looking forward to a pleasurable experience is in itself pleasurable	.51	.25	.46	.22
16. I look forward to a lot of things in my life	.58	.17	.43	.23
17. When ordering something off the menu, I imagine how good it will taste	.62	.15	.64	.13
18. When I hear about a new movie starring my favorite actor, I can't wait to see it	.54	-.01	.48	-.06
Internal consistency ( $\alpha$ )	.74		.72	
<b>Consummatory factor</b>				
2. The sound of crackling wood in the fireplace is very relaxing	.11	.63	.12	.72
4. I love the sound of rain on the windows when I'm lying in my warm bed	.04	.66	.28	.44
5. The smell of freshly cut grass is enjoyable to me	-.05	.65	-.03	.64
6. I enjoy taking a deep breath of fresh air when I walk outside	.17	.56	.06	.58
8. A hot cup of coffee or tea on a cold morning is very satisfying to me	.26	.40	.27	.22
9. I love it when people play with my hair	.19	.43	.21	.35
10. I really enjoy the feeling of a good yawn	.19	.50	.25	.36
13. I appreciate the beauty of a fresh snowfall	.09	.63	.03	.61
Internal consistency ( $\alpha$ )		.71		.64
TEPS Total Scale Internal consistency ( $\alpha$ )	.79		.78	
Anticipatory and consummatory scale inter-correlation	.41		.46	

respectively. Again, regardless of whether we used VARIMAX or OBLIMIN rotations, two factors, corresponding to anticipatory and consummatory pleasure, were extracted. The one exception to this factor distinction is the item “A hot cup of coffee or tea on a cold morning is very satisfying to me,” which loaded fairly low on both factors. One reason for this may be the fairly low occurrence of cold mornings in the Miami area. The coefficient  $\alpha$  reliabilities in this sample were also similar to the derivation sample with the TEPS-Total scale  $\alpha = .78$ , TEPS-ANT  $\alpha = .72$ , and TEPS-CON  $\alpha = .64$  (likely somewhat lower because of the aforementioned divergent item). The correlation between the two scales was similar to what was found in the derivation sample B, with  $r = .46$  and mean inter-item correlations were also similar: TEPS-Total, TEPS-ANT, and TEPS-CON items, respectively:  $r = .17$ ,  $.23$ , and  $.21$ . In all, the similarity of the factor structures in these two large samples indicates that the TEPS is a measure that can be generalized to different regional populations.

#### 2.3.6. Are there sex differences?

From the derivation sample (B), men scored lower on the TEPS-Total, TEPS-ANT, and TEPS-CON than women. Means for men (with standard deviations in parentheses) were 4.22 (0.63), 4.23 (0.72), and 4.21 (0.79), for the TEPS-Total, TEPS-ANT, and TEPS-CON, respectively. For women the means were 4.56 (0.61), 4.57 (0.69), and 4.54 (0.78), respectively. To test whether these differences were significant, we conducted a 2 (sex: male, female)  $\times$  3 (TEPS-Total, TEPS-ANT, and TEPS-CON) MANOVA. The analysis revealed a significant effect for sex  $F(1,1020) = 37.71$ ,  $p < .001$ . Follow-up  $t$  tests indicated that women scored significantly higher than men in their TEPS-Total  $t(1021) = 8.67$ ,  $p < .001$ , TEPS-ANT  $t(1021) = 7.62$ ,  $p < .001$ , and TEPS-CON  $t(1021) = 6.70$ ,  $p < .001$  scores. The same analysis was completed on the validation sample (sample E) with identical results.

#### 2.4. Summary of Study 1

The Temporal Experience of Pleasure Scale (TEPS) showed a clear, interpretable factor structure, with good internal consistency and good test–retest reliability. This scale appears to be measuring distinct components of anticipatory and consummatory pleasure within the larger rubric of general physical pleasurable experience. This distinction is important when considering the earlier described theoretical (e.g., Depue & Collins, 1999; Klein, 1984; Rozin, 1999) and empirical (e.g., Berridge & Robinson, 1998; Knutson et al., 2001) literature highlighting this important parsing of the experience of pleasure. These results also seem to indicate that stable individual differences exist in the propensity to experience both anticipatory pleasure and consummatory pleasure. Consistent with predictions, women scored higher than men on the TEPS, a finding that is consistent with research showing that women recall positive events and memories more vividly than men. (Feldman Barrett, Robin, Pietromonaco, & Eysell, 1998; Oishi, Schimmack, & Diener, 2001; Seidlitz & Diener, 1998).

### 3. Study 2: Convergent and discriminant analyses—correlates of anticipatory and consummatory pleasure

Once a final item set was established, we looked to other measures to further validate the TEPS, including existing measures of pleasure and anhedonia, approach and avoidance motivational systems, and personality. This was done to confirm that the TEPS was

reliably related to similar constructs (such as pleasure and approach), distinct from unrelated constructs (such as avoidance, negative emotion, and social desirability), and that the TEPS-ANT and TEPS-CON were distinct from each other (using specific personality and psychopathology trait measures). Our hypotheses about the distinctions between these specific components of pleasure suggest that the TEPS-ANT should be related to such traits as imagery ability, responsiveness to reward, some aspects of approach, and positive affect. TEPS-CON on the other hand, should be related to concepts such as openness to a variety of experiences and to an appreciation of pleasurable stimuli in a variety of sensory domains. We use the terms convergent and discriminant to refer to both the conceptual similarity and difference of the TEPS scales from other measures, and also to distinguish the TEPS-ANT and TEPS-CON from each other.

### 3.1. Method

#### 3.1.1. Participants

Participants were from samples A and C from Study 1 and also from sample D, which included 221 women and 130 men ( $M$  age of 22.23 years,  $SD=4.67$ ). Packets of questionnaires with differing scale contents were included in different subsets of the three samples. Therefore, the sample sizes differ for each of the convergent and discriminant measures. In other words, the  $N$ 's listed for each scale below differs from scale to scale depending on the various samples of which it was included.

#### 3.1.2. Scales

In addition to the TEPS described above, participants completed the following questionnaires tapping pleasure, emotion, and personality constructs. The revised Physical Anhedonia Scale (PAS; Chapman et al., 1976) is a 61-item scale used to measure the diminished ability to experience pleasure ( $N=231$ ), which we expected the moderately to strongly negatively correlated to the TEPS-CON, more so than the TEPS-ANT since the PAS does not include an anticipatory component. The Fawcett–Clark Pleasure Scale (FCPS; Fawcett, Clark, Scheftner, & Gibbons, 1983) is a scale designed to measure the experience of pleasure, particularly in depressed patients ( $N=231$ ). We expected modest correlations on both scales of the TEPS as the designers of the FCPS attempted to include some component of anticipatory pleasure (but did not create specific subscales). The Behavioral Inhibition and Behavioral Activation Scales (BIS/BAS; Carver & White, 1994) is a 24-item scale that measures trait approach and avoidance motivation ( $N=230$ ). We expected no relation between the BIS and either TEPS-ANT or TEPS-CON, but expected the BAS subscales to modestly correlate to TEPS-ANT (in particular the BAS subscale reward responsiveness). The Questionnaire upon Mental Imagery (QMI; Betts, 1909) is a 35-item questionnaire that measures trait ability to image various stimuli ( $N=266$ ). Anticipatory pleasure should include the ability to bring to mind a pleasurable stimulus in its absence (Berridge & Robinson, 2003), therefore we expected the QMI to be modestly related to TEPS-ANT, but not the TEPS-CON.

Participants also completed the NEO-Personality Inventory-R (Costa & McCrae, 1992), which measures the following personality traits: extraversion (E), openness (O), conscientiousness (C), neuroticism (N), and agreeableness (A) ( $N=205$ ). We expected E to be related to both scales of the TEPS, with the facet of excitement-seeking to be more related to TEPS-ANT than TEPS-CON, given that anticipatory pleasure is thought to activate

approach. We also expected O to be modestly related to both scales of the TEPS, but more so the TEPS-CON since openness refers to an openness to experience a lot of different types of activities and stimuli. By contrast we expected that personality constructs such as N, A, and C would be unrelated to the two TEPS scales. The Positive and Negative Affect Scales (PANAS general; Watson, Clark, & Tellegen, 1988) measures the trait or dispositional tendencies to experience positive or negative emotion in general ( $N = 144$ ). Participants were asked to what extent they experienced specific affect terms generally or on average. While we expected both TEPS scales to be related to the Positive Affect (PA) subscale of the PANAS, we expected a stronger relation between PANAS PA and TEPS-ANT since both PA and anticipatory pleasure have been linked with dopaminergic activation (e.g., Ashby, Isen, & Turken, 1999; Wise, 1991). We expected the TEPS would be unrelated to the Negative Affect scale (NA) of the PANAS. The Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) is a 21-item scale designed to measure depressive symptoms ( $N = 210$ ). This scale has 2 or 3 items that are related to the symptom of anhedonia, therefore we expected only a very modest correlation with the TEPS scales, and we expected this correlation to be strongest with TEPS-ANT (Burns, 1990). Finally, the 10-item short form of the Marlowe–Crowne social desirability scale (MC; Ballard, 1992), which measures the tendency to portray oneself in a favorable light ( $N = 231$ ), was expected to be unrelated to the TEPS scales.

### 3.2. Results and discussion

Table 4 shows the correlations of the TEPS-ANT and TEPS-CON scales with the convergent and discriminant measures (as well as Cronbach's  $\alpha$  and inter-item correlations for all scales). As expected, both TEPS scales were negatively correlated with the Physical Anhedonia Scale (PAS) providing evidence that the TEPS is related to measures of anhedonia. Also as predicted, the PAS was more strongly correlated with the TEPS-CON than the TEPS-ANT ( $t$  test for nonindependent samples;  $t(228) = 5.29, p < .001$ ). Both scales of the TEPS were moderately correlated with the Fawcett–Clark pleasure scale (FCPS), with no significant difference between the two scales. This was expected as the FCPS does not have any specific subscales with which to test an anticipatory/consummatory distinction (Fawcett et al., 1983).

The Behavioral Activation Scales of the BIS/BAS were all correlated with the TEPS scales as predicted. In particular, the BAS reward responsiveness scale (BAS RR) was moderately correlated with the TEPS-ANT, significantly more so than with the TEPS-CON. ( $t(227) = 8.79, p < .001$ ), indicating that the ability to be responsive to reward cues may be related to anticipatory pleasure, but not necessarily consummatory pleasure. We expected, on the other hand the Behavioral Inhibition Scale to be unrelated to the TEPS scales, but found a small but significant correlation with the TEPS-ANT, which was significantly higher than the BIS's relationship to the TEPS-CON ( $t(227) = 2.04, p < .05$ ). Further analyses revealed that the BIS in our sample was correlated with BAS RR at .30 (similar to findings of Carver & White, 1994), and that when a partial correlation was computed between the BIS and the TEPS-ANT, controlling BAS RR, the correlation dropped to .10, which was no longer statistically significant. This suggests that the observed correlation between the BIS and TEPS-ANT may be better accounted for by the shared variance between the BIS and BAS RR.

Table 4

Cronbach's  $\alpha$ , mean inter-item correlations, and correlations between the TEPS scales and convergent and discriminant measures

	Scale $\alpha$	Mean inter-item correlation	TEPS-ANT	TEPS-CON
Physical Anhedonia Scale	.85	.12	–.41	–.63 <sup>a</sup>
Fawcett–Clark Pleasure Scale	.92	.24	.42	.38
Behavior Activation Scale (BAS) total	.77	.21	.37 <sup>a</sup>	.24
BAS drive	.73	.41	.17	.13
BAS fun seeking	.64	.31	.28	.25
BAS reward responsiveness	.65	.28	.38 <sup>a</sup>	.11
Behavioral Inhibition System (BIS)	.75	.30	.20 <sup>a</sup>	.02
Questionnaire upon Mental Imagery	.96	.42	.26 <sup>a</sup>	.02
NEO-Personality Inventory				
Extraversion	.82	.25	.28	.27
Warmth			.25	.28
Gregariousness			.22 <sup>a</sup>	.06
Assertiveness			.07	.14
Activity			.09	.19
Excitement-seeking			.20 <sup>a</sup>	.09
Positive emotions			.30	.31
Openness	.74	.28	.11	.33 <sup>a</sup>
Fantasy			.10	.13
Aesthetics			.13	.33 <sup>a</sup>
Feelings			.17	.20
Actions			–.01	.22 <sup>a</sup>
Ideas			.07	.25 <sup>a</sup>
Values			–.01	.23 <sup>a</sup>
Agreeableness	.77	.23	.13	.15
Conscientiousness	.86	.22	.08	.07
Neuroticism	.85	.24	.11	–.11
Positive Affect (PANAS)	.87	.40	.16	.20
Negative Affect (PANAS)	.89	.47	.10	–.01
Beck Depression Inventory	.86	.28	–.22 <sup>a</sup>	–.05
Marlowe–Crowne Social Desirability	.61	.19	–.03	.06

Note. Correlation values in bold between TEPS scales and convergent and discriminant indicate  $p < .05$ .

<sup>a</sup> Indicates that the correlation for this scale was significantly higher in absolute size than for the other scale at  $p < .05$  ( $t$  test for nonindependent correlations).

As predicted, there was a small but significant correlation between the QMI and the TEPS-ANT but not the TEPS-CON, and this difference in correlations was significant ( $t(263) = 6.23, p < .001$ ). As stated earlier, one component of anticipatory pleasure is the ability to imagine positive or pleasurable stimuli (Berridge & Robinson, 2003). Having the ability to imagine or 'see' an upcoming stimulus may well allow one to experience more pleasure in anticipation.

The TEPS scales were related to personality constructs E and O as predicted (see Table 4 for correlations of all personality factors, including all facets of E and O). Of particular relevance to the discrimination of the TEPS-ANT and TEPS-CON, the TEPS-ANT was more related to gregariousness than was TEPS-CON. ( $t(202) = 2.85, p < .01$ ). It is not clear why gregariousness in particular is more associated with TEPS-ANT, but we speculate that it could be that high scorers on gregariousness tend to seek out social stimulation, and that this may be related to our conceptualization of anticipatory pleasure as being closely related to the engagement of motivational processes (e.g., Depue & Collins, 1999). As

predicted, openness correlated higher with TEPS-CON than TEPS-ANT ( $t(202) = 4.98$ ,  $p < .001$ ). In particular, there were moderate correlations between the TEPS-CON with the facets of ‘aesthetics,’ ‘actions,’ ‘ideas,’ and ‘values,’ lending support for our hypothesis that consummatory pleasure is a separate construct from anticipatory pleasure and includes the enjoyment of many things and an ability to fully appreciate sources of positive stimulation.

Though we expected PANAS positive affect to be related to TEPS-ANT, there was only a modest correlation between the two scales. It is unclear why this was the case. One possibility is that TEPS-ANT may be related to state PA only in the context of behavioral approach. Carver (2001) has argued that positive affect is experienced especially as one perceives that he or she is in the process of moving towards a goal. Thus, it may be that under the circumstances of moving towards a particular goal (or in the state experience of anticipatory pleasure) that a relationship would be seen with PA.<sup>3</sup> Certainly this warrants further investigation.

Other constructs that we expected to show little to no correlation with the TEPS were NA, social desirability, and depression. The TEPS scales were unrelated to both PANAS NA and the Marlowe–Crowne social desirability scale indicating that scores on the TEPS were not linked to the disposition to experience negative emotions or a tendency to report oneself in a positive light. Finally, as predicted the TEPS-ANT was only mildly, negatively related to the BDI, while the TEPS-CON was unrelated to the BDI, and this difference was significant ( $t(207) = 18.43$ ,  $p < .001$ ). This indicates that the experience of anticipatory pleasure is more (negatively) related to depression, as measured by the BDI, than is consummatory pleasure. One interpretation of this finding is that a hedonic deficit seen in depression is more related to anticipatory pleasure than consummatory pleasure. Further research would need to confirm this.

### 3.3. Summary of Study 2

These findings show that the TEPS-ANT and TEPS-CON scales are related to, but clearly distinguishable from several personality, motivation, and pleasure constructs. Specifically, both scales are related to other pleasure scales as well as aspects of approach, positive affect, extraversion, and openness, but are not redundant with measures of these other constructs. Though there is some similarity across items between the TEPS and these other measures, the modest magnitude of the correlations to these other scales indicates that the TEPS is not redundant with previous measures. Importantly, the TEPS-ANT and TEPS-CON are distinguishable from each other as well in that these two scales show a differential pattern of correlations with measures of personality, affect, and hedonic experience. In particular, as predicted, anticipatory pleasure is more related to trait measures of reward responsiveness and imagery, while consummatory pleasure is more related to openness to experiences, appreciation of positive stimuli, and trait measures of anhedonia.

## 4. General discussion

In this article, we have reported on a brief measure of experiences of anticipatory and consummatory pleasure. Current theory (e.g., Depue & Collins, 1999; Morrone-Strupinsky & Depue, 2004) as well as empirical work in neuroscience (e.g., Berridge & Robinson, 1998; Knutson et al., 2001), psychopathology (e.g., Gard et al., 2000; Klein, 1984), and social

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<sup>3</sup> We thank an anonymous reviewer for this suggestion.

psychology (e.g., Gilbert & Wilson, 2000) have all supported the importance of this distinction. In spite of these empirical and theoretical distinctions, we are only beginning to understand the mechanisms that connect pleasure and motivation, or the individual differences that likely reside within them. The TEPS is a brief but reliable, temporally stable, and valid measure of anticipatory and consummatory pleasure for those interested in studying these important processes.

Though related processes, we hypothesized that anticipatory and consummatory pleasure would be distinct from each other experientially. This was hypothesized both because of the neuroscience research indicating this distinction, but also because of the burgeoning social psychology and psychopathology research in this area. Indeed, this experiential distinction was found. Additionally we hypothesized that anticipatory and consummatory pleasure would be related differentially to specific motivational processes. In line with this prediction we found that individual differences in the ability to experience pleasure in anticipation were more closely related to motivational processes such as ‘reward responsiveness’ and ‘behavioral activation’ than were individual differences in consummatory pleasure. Consummatory pleasure, on the other hand was more closely related to appreciation of diverse positive stimuli and an overall openness to varied experiences.

This further parsing of pleasure into its temporal components, with particular focus on anticipatory pleasure, is very much in line with what cognitive psychologists term “mental time travel” (e.g., D’Argembeau & Van der Linden, 2004; Suddendorf & Busby, 2005; Tulving, 2002). These researchers point out that the ability to project oneself into the future may be a uniquely human trait, and this ability is certainly related to what we have termed anticipatory pleasure here. In fact, though not measured in our scale, certainly both the ability to predict what will be pleasurable in the future, and the ability to activate past representations of pleasurable events, are important components of the anticipation of pleasurable events. Further research that clarifies these distinctions should be helpful in our understanding the cognitive processing of time, and its motivational and experiential significance.

Additionally, this line of research will be helpful in understanding populations with some impairment in hedonic experience. Our analysis of ‘anhedonic’ subgroups in the derivation sample of the TEPS indicated that there was less than a 10% overlap in anticipatory and consummatory pleasure anhedonic subgroups. In other words, the bulk of individuals reporting a diminished ability to experience anticipatory pleasure were different than those reporting a consummatory pleasure deficit, confirming a distinction made by Klein (1984) in his theoretical work on different types of anhedonia in depression. Further research on these anhedonic groups is needed to confirm these distinctions and to link these anhedonic subgroups to what is known in the existing psychopathology literature about hedonic deficit in depression and schizophrenia.

One limitation of the TEPS is that it only measures two components of the experience of pleasure, excluding such aspects as memory formation, approach behavior, approach motivation and satiation. Memory formation is difficult to disentangle from other components in a self-report scale as any question asked relies on an individual’s ability to recall past pleasurable experiences. Therefore this component is perhaps better tested in a laboratory setting. Similarly, approach behavior is probably not particularly well suited for a questionnaire method. As mentioned earlier, existing measures for approach motivation such as the BAS scales are widely used. Future studies may need to address the issue of satiation more directly as this certainly could have implications for the experience of pleasure both from the perspective of an over and under-active satiation mechanism.

In summary, the Temporal Experience of Pleasure Scale (TEPS) was developed using a deductive rational strategy to measure distinct aspects in the experience of anticipatory and consummatory experiences of pleasure. Using several large college-age samples we found that these experiences were in fact distinct, and that these experiences were correlated with several other predicted measures of personality and emotional experience. This scale should add to the growing literature on pleasure, well-being, and positive psychology, as well as help differentiate aspects of pleasure important to research in psychopathology (e.g., in schizophrenia and depression).

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