

‘Wanting’ and ‘liking’ skin picking: A validation of the Skin Picking Reward Scale

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Background and aims: Excoriation (skin-picking) disorder (SPD) is often conceptualized as a behavioral addiction in which aberrant reward processing may play an important role. The current study sought to develop a self-report instrument – the Skin Picking Reward Scale (SPRS) – that measures how strongly skin picking is ‘liked’ (i.e., the degree of pleasurable feelings while receiving the reward) and ‘wanted’ (i.e., the degree of the motivation to seek the reward). **Methods:** We administered the SPRS to individuals who endorsed excessive skin picking in online surveys and examined the scale’s factor structure (Studies 1 and 2). We then asked individuals with documented pathological skin picking to complete the SPRS and other relevant questionnaires on two occasions one week apart (Study 3). **Results:** Exploratory (Study 1; $n = 330$) and confirmatory (Study 2; $n = 144$) factor analyses consistently supported a two-factor structure reflecting the ‘liking’ and ‘wanting’ constructs. Results from Study 3 ($N = 36$) indicated that the Wanting and the Liking scales had adequate internal consistency and test–retest reliability. Additionally, consistent with predictions, the Wanting scale, but not the Liking scale, was associated with picking urges the following week, greater cue-reactivity, and more picking-related routines/habits. **Discussion:** These initial findings suggest that SPRS is a psychometrically sound measure of ‘wanting’ and ‘liking’ in pathological skin picking. The SPRS may facilitate research on reward processing anomalies in SPD and serve as a useful clinical instrument (e.g., to identify those at risk for cue-induced relapse).

Keywords: skin picking, reward, incentive-sensitization theory, behavioral addiction, psychometric

INTRODUCTION

Excoriation (skin-picking) disorder (SPD) is a psychiatric condition characterized by excessive picking of one’s own skin. In the DSM-5, SPD is defined as recurrent skin picking that is not better accounted for by another mental disorder or dermatological problem and results in skin damage, repeated failed attempts to stop the behavior, and subjective distress or impairment in functioning (APA, 2013). The behavior is typically chronic and persists for years or decades despite negative consequences such as repeated infections, disfigurement, emotional distress and social interference. Approximately 1–2% of the general population meets diagnostic criteria for SPD (e.g., Keuthen, Koran, Aboujaoude, Large & Serpe, 2010) and a large majority (75–90%) of individuals who seek treatment for SPD are female (Snorrason, Belleau & Woods, 2012).

The clinical severity of skin picking differs substantially across individuals. To capture this individual difference, psychometrically sound instruments have been developed to assess variables such as frequency of picking behaviors and psychosocial impairment related to picking (Snorrason, Olafsson et al., 2012). Although such instruments can be useful to index the clinical impact of SPD, they may not adequately gauge underlying etiological mechanisms. Valid instruments that reflect individual differences in subjective correlates of etiological mechanisms have the potential of facilitating etiological research and help identify clinically meaningful subgroups.

Studies show that many individuals with SPD experience intense craving for skin picking and pleasure or gratification during picking episodes (Snorrason, Smari & Olafsson, 2010), and several authors have argued that abnormal reward processing may be an important underlying contributor of SPD (Odlaug & Grant, 2010; Roos, Grant, Fouche, Stein & Lochner, 2015) and related disorders (e.g., hair pulling disorder; White et al., 2013). Thus, the aim of the current study was to develop a self-report scale that captures individual differences in reward processing related to skin picking behaviors.

‘Wanting’ and ‘liking’ skin picking

Theorists have emphasized the difference between ‘liking’ and ‘wanting’ a reward, two processes that are mediated by overlapping but distinct neural circuits (Berridge, 2007; Berridge, Robinson & Aldridge, 2009; Robinson & Berridge, 1993). ‘Liking’ processes underlie pleasurable experiences associated with receiving a reward (e.g., “euphoria” when taking drugs, pleasurable feelings when eating tasty food). ‘Wanting’, on the other hand, represents a motivational state that promotes seeking of the reward. In particular, it is believed that ‘wanting’ circuits (i.e., mesolimbic dopamine circuits) function to assign incentive salience to rewards and reward-related cues. Thus, cues attributed with incentive

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saliency will trigger the motivational state of ‘wanting’ which makes the reward become attractive and sought after. Pathological ‘wanting’ is thought to play a crucial role in a variety of compulsive/addictive behaviors including drug addictions (Robinson & Berridge, 1993), excessive gambling (Linnet, 2014) and some forms of pathological eating (Berridge, Ho, Richard & DiFeliceantonio, 2010). Similarly, recent neuroimaging research suggests that SPD subjects show abnormal activation in brain areas implicated in ‘wanting’ processes (Roos et al., 2015).

Correlates of ‘wanting’ and ‘liking’

The aim of the current study was to develop a self-report instrument that measures how much an individual ‘wants’ and ‘likes’ skin picking. It is assumed that both ‘wanting’ and ‘liking’ are preconscious processes (supported by subcortical brain regions) but can be translated into conscious experiences through higher cortical mechanisms (Robinson & Berridge, 1993). ‘Wanting’ processes presumably correspond with the subjective experience of craving or wanting (no quotation marks) for the reward, and ‘liking’ with pleasurable experiences when receiving the reward.

However, when measuring subjective correlates of ‘liking’ and ‘wanting’, differentiating between the two processes remains a challenge. ‘Liking’ and ‘wanting’ frequently co-occur – a person can be hungry (‘wanting’) while at the same time enjoying the taste of the food she is eating (‘liking’) – and people readily report ‘wanting’ as ‘liking’, and vice versa. Nonetheless, it seems plausible that in certain contexts the two processes have unique subjective correlates. For example, the degree of pleasurable feelings at the moment of picking likely reflects ‘liking’ to a greater extent than ‘wanting’. Thus, self-reported pleasurable feelings during picking episodes may serve as a relatively unique marker of ‘liking’ processes.

In contrast, ‘wanting’ processes may be more correlated with anticipatory emotions such as urges or cravings for the reward. Moreover, animal research (e.g., Berridge, Robinson & Aldridge, 2009) have identified distinct properties of cues that have been previously attributed with incentive saliency (i.e., are ‘wanted’), and self-report items focusing on these cue properties may adequately differentiate ‘wanting’ from ‘liking’. First, studies have shown that cues attributed with incentive saliency have the ability to trigger peaks of ‘wanting’ for the reward that in turn promote reward-seeking behavior (e.g., Wyvell & Berridge, 2000). Such cue-reactivity is frequently observed in individuals with SPD many of whom experience a sudden craving for skin picking (Odlaug & Grant, 2008) in response to conditioned cues (i.e., affective states, memories, the sight or feel of skin imperfections, etc.). Thus, the degree of cue-reactivity among individuals with SPD may reflect how much skin picking is ‘wanted’.

Second, it has been shown that cues embedded with incentive saliency become ‘wanted’ themselves and thus acquire the ability to reinforce a new instrumental response via conditioned reinforcement (Berridge, 2007; Berridge, Robinson & Aldridge, 2009). Many individuals with SPD engage in various habits or routines before, during and especially after the act of picking. These often include

playing with the picked skin, scrutinizing it, chewing on it, and consuming it (Snorrason, Ricketts, et al., 2012). It is possible that some of these behaviors become reinforcing because of a pairing with picking-related rewards or reward cues. Accordingly, more ‘wanting’ should be associated with more picking-related routines/habits.

The current studies

In an initial attempt at developing a self-report measure of ‘wanting’ and ‘liking’ skin picking, we conducted three studies. In Study 1, we created 27 items presumed to assess ‘wanting’ or ‘liking’ skin picking and administered them to a large online sample of individuals with excessive skin picking. We then examined the factor structure of the items with exploratory factor analysis (EFA). Psychometrically sound items were selected and a questionnaire with ‘wanting’ and ‘liking’ subscales created – the Skin Picking Reward Scale (SPRS; see appendix A). In Study 2, we sought to verify the two-factor structure of the SPRS in an independent sample using confirmatory factor analysis (CFA). In Study 3, individuals with documented pathological skin picking completed the SPRS along with other self-report measures at two time points one week apart. We examined internal consistency and test–retest reliability of the Wanting and Liking subscales, as well as their relation with four validity criteria: positive affect during picking the following week, symptom severity the following week, degree of cue-reactivity and frequency of picking-related habits/routines.

STUDY 1

The aim of Study 1 was to create a pool of ‘wanting’ and ‘liking’ items and examine their factor structure with EFA. We created ‘liking’ items by simply referring to pleasurable experiences during picking (e.g., “I enjoy the act of picking skin”), or overall positive attitudes toward the act of picking (e.g., “I love picking skin”). In the drug addiction literature, ‘wanting’ has typically been assessed with items asking how much the individual wants, desires or craves the drug (e.g., Lambert, McLeod & Schenk, 2006). We therefore created several ‘wanting’ items that referred to such experiences (e.g., “I feel compelled to pick skin” and “I simply want to pick skin”). However, limited information is available on the psychometric properties of this approach, and it is unclear how well this type of items differentiates ‘wanting’ from ‘liking’. Thus, we also created ‘wanting’ items that focused on cue-reactivity (e.g., “certain cues can suddenly evoke strong desire to pick skin”). Given that cue-reactivity is a unique feature of ‘wanting’ (Berridge, 2007; Berridge, Robinson & Aldridge, 2009), such items may be better suited to differentiate between the two constructs.

METHOD

Participants

A large sample of college students ($N = 2,743$) completed an online survey that included screening items for

excessive skin picking (see below). Participants in Study 1 were 330 responders who had endorsed a current habit of excessive skin picking in the survey. The mean age of the skin picking sample was 19.3 years ($SD = 2.3$), 77% were female, 75% Caucasian, 11% Hispanic/Latino, 4%, Black/African-American, 4% Asian, 4% multiracial, and 2% other races/ethnicities.

Procedure and measures

College students at two US universities (University of Wisconsin-Milwaukee and Texas A&M University) were invited to complete an online survey in exchange for course credit. The survey included screening questions for excessive skin picking, the ‘wanting’ and the ‘liking’ items, and other items unrelated to the current study.

Screening items and inclusion criteria. The following item was used to screen for excessive skin picking: *In your lifetime, have you ever had the habit of excessively picking at your skin?* Response options were: a) *No never*, b) *I sometimes pick skin, but it is never excessive*, c) *Yes, these days I pick skin excessively (at least some picking the past month)* and d) *Yes, in the past I used to pick skin excessively (no picking the past month or longer)*. Participants who endorse option c) were included in the study sample.

‘Wanting’ and ‘liking’ items. This scale included 27 ‘wanting’ and ‘liking’ items (see [Table 1](#)). Responders were instructed to indicate how often the statements apply to their skin picking on a five-point scale: (1) *almost always*, (2) *often*, (3) *sometimes*, (4) *rarely*, and (5) *almost never*. (In [appendix A](#), the response scale is reversed).

Ethics

The institutional review boards of the University of Wisconsin-Milwaukee and Texas A&M University approved the study. All participants were required to read an online consent form and provide consent prior to filling out the survey.

RESULTS

Exploratory factor analysis

The item pool was subjected to EFA with Principal Axis Factoring extraction method and oblique rotation ($\delta = 0$) of the extracted factors. Four factors had initial eigenvalues greater than one (14.54, 2.03, 1.56, and 1.11) and together accounted for 71.3% of the variance. Two, three and four factor solutions were investigated. Rotation of four factors failed to converge. The three-factor solution did not appear meaningful, as three of the six items on the third factor loaded above .30 on two factors and none of the items had a strong loading ($> .60$) on their designated factor. Two factors were therefore retained, which is in agreement with the theoretical predictions and scree plot that indicated that two factors should be extracted. The two factors accounted for 52.4% and 6.2% of the variance, or 58.6% in total. All 27 items had a factor loading above .30 on at least one of the two factors (see [Table 1](#)).

Questionnaire development

In order to develop a questionnaire with meaningful ‘liking’ and ‘wanting’ subscales we excluded items based on two criteria: 1) items that did not load on a factor as predicted (e.g., a ‘wanting’ item that loaded on the ‘liking’ factor), and 2) items that loaded on both factors (i.e., .30 or higher). Factor I was labeled the Liking factor as 10 of the 17 items that had their highest loading on it were presumed to reflect ‘liking’ skin picking (items 1, 2, 3, 4, 5, 8, 11, 14, 15, and 16). Two of these 10 items (items 14 and 16) were excluded because they loaded on both factors. The other seven items (items 6, 7, 9, 10, 12, 13, 17) were expected to assess ‘wanting’ and therefore excluded. Factor II was labeled the Wanting factor as eight of the 10 items with primary loading on it were predicted a priori to assess ‘wanting’ (items 18, 19, 20, 21, 22, 24, 26, and 27). Two of these eight items were excluded because they loaded on both factors (items 20 and 26). Additional two items on the factor were excluded because they were expected to assess ‘liking’ (items 23 and 25). After deleting items, the resulting scale included eight ‘liking’ and six ‘wanting’ items. In order to have both factors contribute equally to the total score of the scale, the number of items on each factor should be equal. Thus, we excluded the two items with the lowest factor loadings on the Liking factor (items 11 and 15) leaving six items on each of the two factors (see [appendix A](#)).

DISCUSSION

After deleting items that did not adequately distinguish between the two constructs, the resulting scale included six ‘liking’ and six ‘wanting’ items. Ten of the items that loaded on Factor I clearly assess ‘liking’, and many of them made explicit reference to pleasurable feelings during the act (e.g., “I feel satisfied while I pick skin”). The seven ‘wanting’ items that loaded on this Liking factor mostly referred to anticipatory positive emotions, such as having a desire, longing or yearning to pick (e.g., “I simply want to pick skin”). Thus, it appears that this type of items does not adequately distinguish between ‘liking’ and ‘wanting’ skin picking. On the other hand, items that referred to cue-reactivity (e.g., “When I get a certain feeling, I know I will pick later that day”) loaded almost exclusively on Factor II, which had minimal loading of ‘liking’ items. These results suggest that cue-reactivity items better distinguish ‘wanting’ from ‘liking’.

STUDY 2

The aim of Study 2 was to use CFA to verify the two-factor structure of the 12 item SPRS in an independent sample.

METHOD

Participants

A large sample ($N = 1,215$) of students at the University of Wisconsin-Milwaukee and Texas A&M University completed an online survey that included screening items for

Skin Picking Reward Scale

Table 1. Results from exploratory factor analysis (Study 1; $n = 330$) and confirmatory factor analysis (Study 2; $n = 144$) of the Skin Picking Reward Scale

Item no.*		Presumed Wanting or Liking	EFA (Study 1)		CFA (Study 2)	
			I	II	Liking	Wanting
5	Picking skin gives me great pleasure in the moment	L	.82	-.02	.79	
18	When I get a certain feeling, I know I will pick later that day	W	-.18	.99		.82
2	I enjoy the act of picking skin	L	.89	-.12	.78	
21	Some days I just know I need to pick skin	W	.14	.74		.76
4	I love picking skin	L	.82	-.04	.74	
27	Certain cues (places, smells, feelings, memories) can suddenly evoke strong desire to pick skin	W	.28	.34		.53
3	Skin picking is fulfilling to me	L	.88	-.07	.92	
22	I suddenly get consumed by intense craving for skin picking	W	.18	.68		.90
1	I feel satisfied while I pick skin	L	.95	-.11	.89	
24	Certain feelings let me know I will definitely pick skin later that day	W	.02	.75		.83
8	Skin picking gives me momentary gratification	L	.71	.09	.85	
19	I unconsciously make sure circumstances allow for a picking episode later	W	-.07	.83		.68
13	Something drives me towards picking skin	W	.56	.13		
9	When I think about picking, I usually end up doing it	W	.70	-.03		
10	Even if I want to stop picking, I feel a deep yearning for it	W	.64	.15		
7	I simply want to pick skin	W	.76	.02		
20	I have a longing for a good picking episode	W	.31	.56		
12	I experience a strong desire to pick skin	W	.56	.36		
23	Picking skin gives me a rush	L	.28	.58		
16	Picking skin calms me	L	.51	.30		
25	During skin picking episodes, I am in bliss	L	.32	.56		
14	Picking skin makes me feel good, at least in the moment	L	.55	.34		
6	I feel compelled to pick skin	W	.79	-.10		
17	I find myself picking skin, and I don't know why	W	.44	.08		
26	Sometimes, I end up picking even if I don't want to	W	.34	.35		
11	I experience nice bodily sensations when I pick skin	L	.57	.18		
15	Picking skin is energizing	L	.54	.27		

Notes: * The order of the items in the table reflects the order in Study 2, but item numbers reflect the order in Study 1. Exploratory factor analysis (EFA) was conducted using principal axis factoring with oblique rotation of extracted factors. Factor loadings of .30 and greater are bolded. Confirmatory factor analysis (CFA) was conducted using a robust weighted least square estimation method. In the CFA, $p < .05$ for all parameter estimates and correlations between error terms were estimated freely between items 19 and 24 ($.17, p < .05$) and between items 2 and 4 ($.22, p < .05$).

excessive skin picking. Participants in Study 2 were 144 responders who met the criteria for current excessive skin picking habit in the survey. The mean age in the skin picking sample was 19.9 years ($SD = 2.3$), 67% were female, 70% Caucasian, 13% Hispanic/Latino, 7% Asian, 5% Black/African-American, 4% multiracial, and 1% other races/ethnicities.

Procedure and measures

The procedure and measures were the same as in Study 1. The only difference was that the order of the 27 ‘wanting’ and ‘liking’ items were changed so that the 12 items identified in Study 1 were included in the beginning of the scale. In addition, the 5-point response scale was reversed: (1) *almost never*, (2) *rarely*, (3) *sometimes*, (4) *often*, and (5) *almost always*. (See [appendix A](#)).

Statistical analyses

We used Lisrel 8.80 (Jöreskog & Sörbom, 2007) to conduct CFA with the robust weighted least square estimation

method. Polychoric correlation matrix and asymptotic covariance matrix were used for analyses. The following indices were used to evaluate the fit of the models tested: Satorra-Bentler scaled chi-square statistic (S-B χ^2 ; Satorra & Bentler, 1994), the Comparative Fit Index (CFI; Bentler, 1990), the Non-Normed Fit Index (NNFI; Bentler & Bonnet, 1980), the Root Mean-Square Error of Approximation (RMSEA; Browne & Cudeck, 1993) and its accompanying 90% confidence interval (90% CI; MacCallum, Browne & Sugawara, 1996). The chi-square statistic is a badness-of-fit index with higher values representing greater discrepancy between a model and data, thus, small and non-significant values are indicative of a well-fitting model (Kline, 2005). Because the chi-square test is sensitive to sample size, other indices of fit should also be used (Hu & Bentler, 1999). We considered CFI and NNFI values of .95 or higher and a RMSEA value lower than .06 as indicative of a well-fitting model (Hu & Bentler, 1999; Kline, 2005).

The response distribution of all individual SPRS items and its subscale scores was positively skewed and

Kolmogorov-Smirnov test confirmed that the distribution deviated from normality in all cases ($p < .001$). However, we decided not to apply transformation procedures in order to keep the interpretation of resulting data straightforward.

Ethics

Same as for Study 1.

RESULTS AND DISCUSSION

A correlated two factor model provided a reasonable fit to the data, S-B $\chi^2 = 89.38$; $df = 53$; $p = .001$; RMSEA = .069; 90% CI = .043-.094; CFI = .99; NNFI = .99, although RMSEA did not fall below .06. Fit diagnostics indicated that model fit could be improved by allowing error terms to correlate freely between items 21 and 22, items 19 and 24, items 2 and 4, and items 2 and 1. Model modifications resulted in a revised final model with two significant error covariances between items 19 and 24 and items 2 and 4 (the other two error covariances were not significant), that had a good fit according to all fit indices, S-B $\chi^2 = 64.18$; $df = 51$; $p = .102$; RMSEA = .043; 90% CI = .000-.072; CFI = 1.00; NNFI = .99. Factor loadings are reported in Table 1. Error covariances in this model seem to reflect similarity in wording and/or meaning of the items in the pairs. The two factors were highly correlated (.90) suggesting that a single factor might also fit the data. We estimated the fit of a model with all 12 items loading on one factor but found that it did not provide a good fit, S-B $\chi^2 = 130.07$; $df = 54$; $p < .001$; RMSEA = .099; 90% CI = .078-.120; CFI = .98; NNFI = .97. Finally, to maximize precision in parameter estimates, the revised final model was fitted to the data combined from Study 1 and Study 2 ($n = 474$). This model had a reasonable fit, S-B $\chi^2 = 146.92$; $df = 51$; $p < .001$; RMSEA = .063; 90% CI = .051-.075; CFI = .99; NNFI = .99. The correlation between the two latent factors was lower in this total sample, or .74. Overall, the findings from the CFA support the two-factor structure found in Study 1.

STUDY 3

The aim of Study 3 was to examine the reliability and validity of the 12-item SPRS in a sample of individuals with verified skin picking problems. We administered the SPRS to a sample of individuals with documented pathological skin picking on two occasions with one-week interval. We examined internal consistency, test-retest reliability and relation with four criteria to assess concurrent and predictive validity. First, we examined if the Liking scale, to a greater extent than the Wanting scale, would predict positive affect during picking episodes the following week. Second, it can be assumed that 'wanting' a reward leads to a seeking of that reward. Thus, we examined if the Wanting scale, to a greater extent than the Liking scale, would significantly add to the prediction of SPD severity (e.g., frequency of picking, and urges to pick) the following week. Third, given that 'wanting' is characterized by cue-reactivity, we predicted

that the Wanting scale, not the Liking scale, would be associated with enhanced cue-reactivity. Finally, we examined if the Wanting scale, not the Liking scale, would be associated with picking-related habits/routines.

METHOD

Participants

Participants were 36 college students with chronic problematic skin picking. Twenty-seven (75%) were female and the mean age was 22.4 years ($SD = 5.5$, range 18 to 47). Thirty-two (88.9%) self-identified as Caucasian and four (11.1%) as other races/ethnicities (i.e., black, Hispanic/Latino, Asian or multiracial, one in each category).

Diagnostic interview and inclusion criteria

All participants underwent a semi-structured interview designed to assess DSM-5 diagnosis and clinical characteristics of SPD (Snorrason et al., unpublished). The interview assessed current and past skin picking habit, and whether current skin picking behavior resulted in (a) skin lesion, (b) emotional distress, (c) impairment in functioning, (d) desire to stop or reduce picking, and (e) attempts at stopping or reducing picking. The interview also assessed if skin-picking behavior was solely due to a medical condition (e.g., dermatological problem) or another psychiatric disorder (e.g., concerns about appearance in body dysmorphic disorder). Other clinical features assessed included body areas picked, and the course of the skin picking habit (e.g. age at onset, and the longest period gone without picking). Participants were included in the study if they reported current excessive skin picking that was not due to dermatological problem or another psychiatric disorder and resulted in some distress or impairment as indicated by the endorsement of at least two of criteria (a), (b), (c), (d), and (e).

Self-report measures

Skin Picking Scale-Revised (SPS-R; Snorrason, Olafsson et al., 2012). The SPS-R is an 8-item self-report scale that assesses clinical severity of pathological skin picking the past week. The SPS-R includes two subscales: symptom severity scale (1. frequency of urges, 2. intensity of urges, 3. frequency of skin picking and 4. controllability of the behavior) and impairment scale (5. emotional distress, 6. functional impairment, 7. social avoidance and 8. skin damage).

Depression Anxiety and Stress Scales-21 item version (DASS-21; Antony, Bieling, Cox, Enns & Swinson, 1998). The DASS-21 is a widely used self-report questionnaire, with good psychometric properties, that assesses severity of depression, anxiety and stress the past week. Each scale has seven items rated on a 4-point Likert scale.

Picking-related habits/routines. Participants were asked to retrospectively rate several items concerning skin-picking phenomenology during a 30-day period that was typical of their skin picking (e.g., automaticity of the behavior, the

extent to which it regulates boredom/tension, etc.). Among them was the following item: "I had a certain routine before or after engaging in the behavior". Response options were *Never/almost never (0–10%), a little of the time (11–29%), some of the time (30–70%), most of the time (71–89%) and all of the time (90–100%)*.

Cue reactivity test. Responders are asked to imagine being in a situation where they would typically pick. They were then asked to answer four items: (1) *How pleasurable would it be to pick skin?* (2) *How much gratification would you experience if you picked skin?* (3) *Right now, how strong is your desire to pick skin?* (4) *How likely is it that you will pick skin later (assuming circumstances will allow it)?* All items were rated on visual analog scales between two endpoints (e.g., not pleasant, very pleasant). These four items were administered both before and after the administration of questionnaires about skin picking phenomenology (including the 27-item SPSS). We assumed that answering the phenomenology questionnaires served as a cue that evoked longing for skin picking. Thus, the four items should be rated higher after the individual has responded to the phenomenology questionnaires (i.e., increase from before to after suggest more cue-reactivity).

Follow-up survey. This online survey included the SPSS-R, the SPSS and the Picking-Related Emotions Scale (PRES; designed for the current study). The PRES asked subjects to rate the intensity of affective experiences just before, during and immediately after typical picking episodes that occurred during the previous week (e.g., "The past week, on average, how intensely did you experience the following emotions JUST BEFORE picking skin?"). The experiences are *tension, stress, boredom, frustration, pleasure, gratification, a rush, depression, a warm bodily sensation, feeling mesmerized, enjoyment, guilt, shame and regret*. Response options include *not at all, somewhat, moderately and intensely*.

Procedure

Participants were recruited through an online screening survey (not the survey in studies 1 and 2) that students filled out to determine their eligibility for participation in various research studies being conducted in the psychology department at the University of Wisconsin-Milwaukee. Responders who endorsed current excessive and bothersome skin picking in the screening survey were offered (by email invitation) to participate in an in-person study session in exchange for course credit and financial compensation (\$20). During the in-person session, participants filled out the questionnaires (starting with the cue-reactivity test) before undergoing the diagnostic interview (the session also included activities unrelated to the current study). One week later, participants received an email with a link to the online follow-up survey.

Statistical analyses

Cronbach's alpha coefficient (α) was calculated to assess internal consistency and Pearson product-moment correlation coefficient to assess test-retest reliability. Relations

with validity criterions were examined with Pearson correlations or multiple linear regressions in cases where other variables needed to be controlled for. When appropriate, we controlled for general levels of stress, anxiety and depression (DASS-21), because previous research indicated that skin picking behaviors can be influenced by negative affect (e.g., Wilhelm et al., 1999). We also controlled for skin picking severity (SPSS-R) when examining the relation between the SPSS and SPD characteristics that could conceivably reflect severity of the disorder (e.g., picking-related habits/routines, and picking-related positive affect). Standardized residual (Z) change scores were used to index the magnitude of change between two time points. To assess picking-related positive affect we summed up the following PRES items (from the online follow-up survey): *pleasure, gratification, a rush, a warm bodily sensation, and enjoyment* during picking episodes ($\alpha = 0.79$). Similarly, to examine negative self-evaluations we summed up items assessing *shame, guilt and regret* after picking episodes ($\alpha = 0.93$).

Ethics

The institutional review board of the University of Wisconsin-Milwaukee approved the study. Informed consent was obtained from all participants at the beginning of the study session.

RESULTS

Diagnosis and clinical characteristics

Thirty-nine individuals participated in the in-person study session. Two participants were excluded because their primary problem was with nail picking/biting, and their skin picking did not meet our study criteria. Another participant was excluded because skin picking was likely solely due to a dermatological condition (folliculitis). The remaining 36 participants met our criteria for pathological skin picking. Onset of the skin picking problem was typically in early adolescence (mean age = 11.4 years, $SD = 4.7$, range = 5 to 24 years) and the average duration of the problem was 11 years ($SD = 6.5$, range 1 to 37 years). All participants picked skin daily (82%) or almost daily (18%). In all cases, the habit was persistent and chronic. For example, when asked about the longest period gone without picking, more than half (63%) reported less than a week, and almost all (92%) reported less than three months. Scores on the SPSS-R indicated mild to moderate clinical severity (severity scale $M = 7.4$, $SD = 2.8$; impairment scale $M = 3.8$, $SD = 2.2$; total score $M = 11.2$, $SD = 4.3$). Twenty-nine (81%) participants completed the online follow-up survey. We did not find any significant differences between those who completed the survey and those who did not.

The response distribution of all individual SPSS items was positively skewed, however, Kolmogorov-Smirnov test showed that the Liking and the Wanting subscale scores had a normal distribution [Liking: $D(36) = .10$, $p > 0.05$; Wanting: $D(36) = .13$, $p > 0.05$].

Average scores, internal consistency, and test–retest reliability

Table 2 shows average scores and internal consistency of the Liking, Wanting and total scores at time 1 (T1) and time 2 (T2). Also shown is one-week test–retest reliability of the scales. It is noteworthy that the Liking scores were lower at T2 compared to T1. Examination of the data from the 29 participants who completed the scale at both time points showed a significant 14% reduction in Liking score from T1 (M = 16.2, SD = 6.1) to T2 (M = 13.9, SD = 6.7), $t(28) = 2.89, p = .007$.

The influence of negative self-reflections on reduction in liking

We conducted additional analyses to explore possible reasons for the reduction in the Liking scores from T1 to T2. Previous research has shown that the accuracy of hedonic ratings (e.g., palatability ratings) is significantly reduced if the evaluation involves elaboration (Schooler & Mauss, 2010). Typically, more elaboration results in less reported pleasure. One possible reason for the reduction in Liking scores is that the participation in the T1 testing session prompted elaboration of the skin picking habit in the interim week, which in turn influenced the Liking ratings at T2. Unfortunately, we did not assess post-session elaboration; however, at T2 we did assess levels of shame, guilt and regret after picking episodes the previous week. Presumably, these emotions are caused by negative self-reflections regarding the picking habit and can therefore serve as an index of elaboration. Consistent with our hypothesis, levels of picking-related negative self-reflections (shame, guilt and regret) had significant positive correlation with the amount of change in the Liking scale from T1 to T2 ($r = 0.48,$

$p < 0.01$). This correlation remained significant in a linear regression model that controlled for SPS-R severity/impairment, DASS-21 negative affect and the Wanting scale (see Table 3).

Association with picking-related positive affect

Levels of positive affect (e.g., pleasure, gratification, etc.) during picking episodes the following week (measured at T2) were positively correlated with concurrent (T2) scores on the Liking scale ($r = 0.67, p < 0.05$). However, the T1 Liking scores had only a moderate correlation with picking-related positive affect ($r = 0.38, p < 0.05$), presumably because of the reduction in Liking scores at T2. In contrast, picking-related positive affect had strong correlation with the Wanting scores at both T1 ($r = 0.65, p < 0.01$) and T2 ($r = 0.65, p < 0.01$). After controlling for DASS-21 negative affect and SPS-R severity/impairment, the Wanting scale, but not the Liking scale, predicted levels of positive affect during picking episodes the following week (see Table 4).

Association with skin picking severity

Table 5 shows correlations between the SPS-R and SPRS at T1 and T2. Scores on both the Wanting and the Liking scale at T1 had positive correlations with SPS-R severity at T1 and T2.

To examine the predictive validity of the SPRS scales we conducted hierarchical linear regression analysis where the DASS-21 scales and the SPS-R impairment were entered in the first step and the Wanting and Liking scales in the second step. Residual change in SPS-R severity was entered as an outcome variable. Neither the Wanting scale nor the Liking scale added significantly to the prediction of a change in SPS-R severity from T1 to T2 (although, the

Table 2. Average scores, internal consistency and test–retest reliability

	Time 1 M (SD) N = 36	Time 2 M (SD) N = 29	Time 1 α	Time 2 α	Test–Retest r
SPRS Liking	15.9 (6.5)	13.9 (6.7)	.92	.92	.78**
SPRS Wanting	11.9 (5.4)	12.8 (6.4)	.85	.93	.81**
SPRS Total	27.8 (11.0)	26.8 (12.3)	.93	.95	.87**

Notes: α = Cronbach’s alpha coefficient; r = Pearson coefficient; ** $p < 0.001$; SPRS = Skin Picking Reward Scale

Table 3. Summary of hierarchical regression analysis for variables predicting change in liking scores

	B	S.E.	Beta	t	p
Step 1 $\Delta R^2 = .04; F(3, 25) = .33, p = .802$					
DASS total	-.01	.02	-.14	-.65	.520
SPS-R total	.01	.06	.02	.10	.919
SPRS Wanting	.03	.04	.15	.65	.521
Step 2 $\Delta R^2 = .22; F(1, 24) = 7.07, p = .014$					
DASS total	-.01	.01	-.13	-.70	.491
SPS-R total	-.01	.05	-.03	-.14	.893
SPRS Wanting	.02	.03	.09	.46	.649
Negative Self-Reflections	.15	.06	.48	2.66	.014

Notes: DASS = Depression Anxiety Stress Scales; SPS-R = Skin Picking Scale-Revised; SPRS = Skin Picking Reward Scale

Table 4. Summary of hierarchical regression analysis for variables predicting picking-related positive affect

	B	S.E.	Beta	T	p
Step 1 $\Delta R^2 = .04$; $F(2, 26) = .59$, $p = .563$					
DASS total	-.04	.05	-.18	-.89	.381
SPS-R total	.12	.14	.17	.86	.396
Step 2 $\Delta R^2 = .40$; $F(2, 24) = 8.7$, $p = .001$					
DASS total	-.03	.04	-.12	-.73	.473
SPS-R total	-.15	.13	-.21	-1.12	.275
SPRS Liking	-.03	.10	-.06	-.26	.800
SPRS Wanting	.38	.12	.77	3.28	.003

Notes: DASS = Depression Anxiety Stress Scales; SPS-R = Skin Picking Scale-Revised; SPRS = Skin Picking Reward Scale

Table 5. SPS-R and SPSR correlations at Time 1 (T1) and Time 2 (T2)

	1	2	3	4	5	6	7
1. T1 SPRS Liking	–						
2. T1 SPRS Wanting	0.73**	–					
3. T2 SPRS Liking	0.78**	0.71**	–				
4. T2 SPRS Wanting	0.75**	0.85**	0.82**	–			
5. T1 SPS-R Severity	0.52**	0.43**	0.21 ^{ns}	0.14 ^{ns}	–		
6. T1 SPS-R Impairment	0.30 ^{ns}	0.46**	0.26 ^{ns}	0.16 ^{ns}	0.53**	–	
7. T2 SPS-R Severity	0.49**	0.44*	0.40*	0.41*	0.70**	0.36 ^{ns}	–
8. T2 SPS-R Impairment	0.08 ^{ns}	0.28 ^{ns}	0.11 ^{ns}	0.01 ^{ns}	0.38*	0.78**	0.31 ^{ns}

Notes: * > 0.05; ** > 0.01; ^{ns} Not significant; SPS-R = Skin Picking Scale-Revised; SPRS = Skin Picking Reward Scale

prediction of the Wanting scale was marginally significant, $p = 0.053$). Similar analyses also failed to show association with change in the SPS-R impairment scale.

However, we conducted additional hierarchical linear regression analyses to examine if the Wanting scale predicted future increase in urge frequency or skin picking frequency separately, using individual items from the SPS-R severity scale as outcomes. The results showed that the Wanting scale, but not the Liking scale, predicted increase in urge frequency (item 1 on the SPS-R), after controlling for DASS-21 negative affect and SPS-R impairment (see Table 6), but neither scale predicted increase in skin picking frequency (item 3 on the SPS-R). These data suggest that the Wanting scale predicts frequency of picking urges, but not frequency of actual picking behavior.

Association with cue-reactivity

Given that ‘wanting’ is characterized by cue reactivity, we examined if the Wanting scale would be correlated with an

increase in the ratings of the following items before and after the presentation of a skin picking cue (i.e., the phenomenology questions): 1) How pleasant would it be to pick skin right now? 2) How much gratification would you experience?, 3) Right now, how strong is your desire to pick skin and 4) How likely is it that you will pick skin later? After controlling for SPS-R severity/impairment and DASS-21 negative affect, the Wanting scale, but not the Liking scale, predicted increases in anticipated pleasure and gratification (see Tables 7 and 8), but neither scale predicted change in current desire or perceived likelihood of picking later.

Association with picking-related habits/routines

The Wanting scale, but not the Liking scale, had a significant positive correlation with frequency of picking-related habits/routines ($r = 0.45$, $p < .006$), and this association remained significant after SPS-R severity/impairment and DASS-21 negative affect was controlled for in a hierarchical regression model (see Table 9).

Table 6. Summary of hierarchical regression analysis for variables predicting urge frequency

	B	S.E.	Beta	t	p
Step 1 $\Delta R^2 = .12$; $F(2, 26) = 1.83$, $p = .181$					
DASS total	.01	.02	.18	.91	.371
SPS-R impairment	.10	.09	.24	1.22	.235
Step 2 $\Delta R^2 = .30$; $F(2, 24) = 6.2$, $p = .007$					
DASS total	.02	.01	.26	1.44	.163
SPS-R impairment	-.03	.08	-.07	-.39	.703
SPRS Liking	-.01	.04	-.08	-.34	.736
SPRS Wanting	.12	.04	.67	2.70	.012

Notes: DASS = Depression Anxiety Stress Scales; SPS-R = Skin Picking Scale-Revised; SPRS = Skin Picking Reward Scale

Table 7. Summary of hierarchical regression analysis for variables predicting expected pleasure

	<i>B</i>	S.E.	Beta	<i>t</i>	<i>p</i>
Step 1 $\Delta R^2 = .16; F(2, 33) = 3.11, p = .058$					
DASS total	-.04	.02	-.31	-1.81	.080
SPS-R total	.14	.06	.38	2.22	.033
Step 2 $\Delta R^2 = .18; F(2, 31) = 4.18, p = .025$					
DASS total	-.03	.02	-.25	-1.60	.120
SPS-R total	.06	.07	.17	.93	.361
SPRS Liking	-.07	.05	-.28	-1.28	.211
SPRS Wanting	.18	.07	.62	2.83	.008

Notes: DASS = Depression Anxiety Stress Scales; SPS-R = Skin Picking Scale-Revised; SPRS = Skin Picking Reward Scale

Table 8. Summary of hierarchical regression analysis for variables predicting expected gratification

	<i>B</i>	S.E.	Beta	<i>t</i>	<i>p</i>
Step 1 $\Delta R^2 = .17; F(2, 33) = 3.26, p = .051$					
DASS total	-.05	.02	-.36	-2.12	.042
SPS-R total	.13	.06	.35	2.05	.049
Step 2 $\Delta R^2 = .16; F(2, 31) = 3.73, p = .035$					
DASS total	-.05	.02	-.34	-2.11	.043
SPS-R total	.04	.07	.10	.57	.575
SPRS Liking	-.02	.05	-.07	-.31	.757
SPRS Wanting	.15	.07	.50	2.32	.027

Notes: DASS = Depression Anxiety Stress Scales; SPS-R = Skin Picking Scale-Revised; SPRS = Skin Picking Reward Scale

Table 9. Summary of hierarchical regression analysis for variables predicting picking-related routines/habits

	<i>B</i>	S.E.	Beta	<i>t</i>	<i>p</i>
Step 1 $\Delta R^2 = .07; F(2, 32) = 1.12, p = .34$					
DASS total	-.01	.01	-.12	-.66	.515
SPS-R total	.05	.04	.27	1.48	.147
Step 2 $\Delta R^2 = .14; F(2, 30) = 2.52, p = .097$					
DASS total	-.01	.01	-.09	-.51	.613
SPS-R total	.02	.04	.08	.40	.693
SPRS Liking	-.02	.03	-.14	-.60	.554
SPRS Wanting	.08	.04	.50	2.07	.048

Notes: DASS = Depression Anxiety Stress Scales; SPS-R = Skin Picking Scale-Revised; SPRS = Skin Picking Reward Scale

DISCUSSION

Both the Wanting and the Liking scale demonstrated good internal consistency and acceptable stability over one week (i.e., $r > .7$), although there was a significant reduction in Liking scores from T1 to T2. Previous studies have shown that elaboration significantly reduces various hedonic ratings (Schooler & Mauss, 2010), and it remains possible that the reduction in the Liking scale was caused by the participant's elaboration on the skin picking habit in the interim between the two assessments. In our experience, as well as that of other researchers (Odlaug & Grant, 2008), many individuals participating in research on SPD have never, or rarely, talked about their skin picking problem with anyone before. Thus, it is possible that participation in the study session prompted self-reflections regarding the habit in the following week, which in turn decreased ratings of liking at T2. Consistent with this speculation, we found that picking-related shame, guilt, and regret during the interim week,

which indicates negative self-reflection regarding the picking habit, had positive correlation with the decrease in the Liking scale. Average scores on other scales (e.g., the Wanting scale) remained the same between the time points and it is therefore improbable that different format (paper/pencil vs. online) explains differences in the Liking scores at T1 and T2.

The failure of T1 Liking scores to predict levels of picking-related positive affect (measured at T2) may also be due to the influence of negative self-reflection. If negative self-reflections influenced Liking scores at T2, they presumably also influenced ratings of picking-related positive affect, which would reduce the correlation of these items with T1 Liking scores. (Note that picking-related positive affect had much higher correlation with T2 Liking scores than T1 with Liking scores).

The Wanting scale showed acceptable validity when evaluated against three criteria. First, it was expected that greater 'wanting' would lead to a greater seeking of the

reward. Although the Wanting scale did not predict increase in frequency of actual picking behavior, it did predict increase in urge frequency (note that the urge item does not have direct content overlap with the Wanting scale). It may be that picking frequency is a somewhat inaccurate validity criterion for the Wanting scale, because a range of factors other than ‘wanting’ may influence whether actual picking behavior is performed, including efforts to stop and situational constraints (e.g., presence of other people, etc.). Frequency of urges to pick is arguably less influenced by such factors and may thus be a more accurate validity criterion.

Secondly, research has shown that cues attributed with incentive salience trigger peaks of ‘wanting’ (e.g., [Wyvell & Berridge, 2000](#)) – or sudden urges for the reward. Thus, we predicted that higher scores on the Wanting scale would be associated with more cue-reactivity. The findings partly supported this prediction. The Wanting scale, but not the Liking scale, had a positive correlation with a cue-induced increase in anticipated pleasure and gratification derived from skin picking. It is noteworthy that the Wanting scale, but not the Liking scale, was associated with cue-reactivity, even though the Liking scale has a greater content overlap with the items (i.e., pleasure/gratification).

Finally, because cues attributed with incentive salience promote conditioned reinforcement of other instrumental behaviors, we examined if the Wanting scale would be associated with picking-related habits/routines, assuming that such behaviors can develop as conditioned response to skin-picking related reward-cues. As predicted, the Wanting scale, but not the Liking scale, had positive correlation with frequency of picking-related habits/routines.

GENERAL DISCUSSION

Our results indicate that SPRS is a psychometrically sound measure of how much an individual ‘likes’ and ‘wants’ skin picking. The Wanting and the Liking scales were highly correlated. However, this is to be expected given the nature of the constructs and Study 3 demonstrated that the two subscales related differentially to several validity criteria. Thus, even though a total score may be appropriate in certain contexts (as a global index of reward-related picking), the two subscales will likely provide the most valid and accurate assessment of the constructs.

Interestingly, the results indicate that ratings on the Liking scale are influenced by negative self-reflections, and presumably other kinds of elaboration, which is consistent with research on hedonic ratings more generally ([Schooler & Mauss, 2010](#)). Even though the test–retest reliability of the Liking scale was acceptable ($r = 0.78$), this effect needs to be taken into account when using the scale (e.g., when repeated assessment is required).

Research on the etiology of SPD is quite limited, and dysfunction in reward processing will arguably be an important focus of future research ([Odlaug & Grant, 2010](#); [Roos et al., 2015](#)). We believe the SPRS may serve as a valuable tool to study the role of reward processing in SPD. In particular, the incentive-sensitization theory ([Robinson & Berridge, 1993](#)) is an influential theory of addiction that

posits that repeated reward (e.g., drug/food) exposure, especially in vulnerable individuals (e.g., due to genetic background or exposure to stress), leads to a long-lasting sensitization of neural circuits that mediate ‘wanting’ (i.e., mesolimbic dopamine circuits). According to the theory, the sensitization leads to hypersensitivity to the reward and associated cues, resulting in excessive seeking of the reward, intense craving in response to cues related to it and propensity for relapse after abstinence. Given preliminary indirect evidence of non-drug induced sensitization ([Berridge & Robinson, 2011](#)), it remains possible that incentive-sensitization theory applies to behavioral addictions (e.g., [Linnet, 2014](#)) such as SPD, although more empirical evidence is needed.

The SPRS may also have important clinical utility as different degrees of ‘liking’ and ‘wanting’ may call for specific clinical management. For example, a measure of ‘wanting’ may help identify individuals at risk for cue-induced relapse. The SPRS may also prove useful in assessing important moderators and mediators of treatment outcome, particularly when ‘wanting’ is a target of treatment.

The current study represents an initial attempt at validating the SPRS and further empirical investigation is needed to adequately determine its psychometric quality. Most of our validity tests concerned the Wanting scale. Measuring subjective liking is relatively straightforward, nonetheless the validity and utility of the scale needs to be tested further and the role of elaboration needs to be clarified. The Wanting scale showed adequate validity when tested against three quite different theoretically derived validity indicators. However, a major limitation of the study is the sole reliance on self-report criterion measures. In future studies, cue-reactivity may be investigated using experimental procedures encompassing different types of cues (e.g., pictures of skin imperfections) and reactivity assessment (e.g., physiological measures). In addition, the Liking and the Wanting scales can be validated against indicators of the underlying neural activity (e.g., using brain imaging, pharmacological manipulations, etc.).

Furthermore, additional psychometric studies are needed to better understand the pattern of score distribution of the SPRS. The response distribution of individual items and subscale scores of the SPRS was non-normal and positively skewed in the Study 2 sample. This indicates that not all individuals with excessive skin picking endorse the experiences addressed in the SPRS items. However, the Wanting and Liking subscale scores displayed normal distribution in the more severe Study 3 sample, which suggests that response distribution becomes more normal on the SPRS as clinical severity of respondents increases. It is important to conduct further research on score distribution on the SPRS across different samples of individuals with varying degrees of pathological skin picking.

Finally, another limitation of SPRS is that the time frame is not clearly indicated when participants are asked to report on their experiences. Future research may want to examine the effect of asking about different time frames when measuring ‘liking’ and ‘wanting’ skin picking (e.g., the past day, week, month, etc.).

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REFERENCES

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders*, 5th edition. Washington, DC: American Psychiatric Association.
- Antony, M. M., Bieling, P. J., Cox, B. J., Enns, M. W. & Swinson, R. P. (1998). Psychometric properties of the 42-item and 21-item versions of the depression anxiety stress scales in clinical groups and a community sample. *Psychological Assessment*, *10*, 176–181.
- Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*, 238–246.
- Bentler, P. M. & Bonnet, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, *88*, 588–606.
- Berridge, K. C. (2007). The debate over dopamine's role in reward: The case for incentive salience. *Psychopharmacology*, *121*, 391–431.
- Berridge, K. C., Ho, C.-Y., Richard, J. M. & DiFeliceantonio, A. G. (2010). The tempted brain eats: Pleasure and desire circuits in obesity and eating disorders. *Brain Research*, *1350*, 43–64.
- Berridge, K. C. & Robinson, T. E. (2011). Drug addiction as incentive sensitization. In J. Poland & G. Grahm (Eds.) *Addiction and responsibility* (pp. 21–54). MIT press.
- Berridge, K. C., Robinson, T. E. & Aldridge, J. W. (2009). Dissecting components of reward: 'Liking', 'wanting' and learning. *Current Opinion in Pharmacology*, *9*, 65–73.
- Browne, M. W. & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 136–162). Newbury Park, CA: Sage.
- Hu, L. & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*, 1–55.
- Jöreskog, K. & Sörbom, D. (2007). *LISREL 8.80 (Computer Software)*. Chicago: Scientific Software International.
- Keuthen, N. J., Koran, L. M., Aboujaoude, E., Large, M. D. & Serpe, R. T. (2010). The prevalence of pathological skin picking in US adults. *Comprehensive Psychiatry*, *51*, 183–186.
- Kline, R. B. (2005). *Principle and practice of structural equation modeling* (2nd ed.). New York: Guildford Press.
- Lambert, N. M., McLeod, M. & Schenk, S. (2006). Subjective responses to initial experience with cocaine: An exploration of the incentive-sensitization theory of drug abuse. *Addiction*, *101*, 713–725.
- Linnet, J. (2014). Neurobiological underpinnings of reward anticipation and outcome evaluation in gambling disorder. *Frontiers in Behavioral Neuroscience*, *8*, 1–5.
- MacCallum, R. C., Browne, M. W. & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods*, *1*, 130–149.
- Odlaug, B. L. & Grant, J. E. (2008). Clinical characteristics and medical complications of pathologic skin picking. *General Hospital Psychiatry*, *30*, 61–66.
- Odlaug, B. L. & Grant, J. E. (2010). Pathological skin picking. *The American Journal of Drug and Alcohol Abuse*, *36*, 296–303.
- Robinson, T. E. & Berridge, K. C. (1993). The neural basis of drug craving: An incentive-sensitization theory of addiction. *Brain Research Reviews*, *18*, 247–291.
- Roos, A., Grant, J. E., Fouche, J.-P., Stein, D. J. & Lochner, C. (2015). A comparison of brain volume and cortical thickness in excoriation (skin picking) disorder and trichotillomania (hair pulling disorder) in women. *Behavioural Brain Research*, *279*, 255–258.
- Satorra, A. & Bentler, P. M. (1994). Corrections to test statistics and standard errors on covariance structure analysis. In A. von Eye & C. C. Clogg (Eds.), *Latent variables analysis* (pp. 399–419). Thousand Oaks, CA: Sage.
- Schooler, J. W. & Mauss, I. B. (2010). To be happy and to know it: The experience and meta-awareness of pleasure. In M. L. Kringelbach & K. C. Berridge (Eds.), *Pleasures of the brain* (pp. 244–254). Oxford: Oxford University Press.
- Snorrason, I., Belleau, E. & Wood, D. (2012). How related are hair pulling disorder (trichotillomania) and skin picking disorder? A review of evidence for comorbidity, similarities and shared etiology. *Clinical Psychology Review*, *32*, 618–629.
- Snorrason, I., Olafsson, R. P., Flessner, C. A., Keuthen, N. J., Franklin, M. E. & Woods, D. W. (2012). Skin Picking Scale-Revised: Factor structure and psychometric properties. *Journal of Obsessive-Compulsive and Related Disorders*, *1*, 133–137.
- Snorrason, I., Ricketts, E. J., Flessner, C. A., Franklin, M. E., Stein, D. J. & Woods, D. W. (2012). Skin picking disorder is associated with other body focused repetitive behaviors: Findings from an Internet study. *Annals of Clinical Psychiatry*, *24*, 292–299.
- Snorrason, I., Smari, J. & Olafsson, R. P. (2010). Emotion regulation in pathological skin picking: Findings from a non-treatment seeking sample. *Journal of Behavior Therapy and Experimental Psychiatry*, *41*, 238–245.
- White, M. P., Shirer, W. R., Molfino, M. J., Tenison, C., Damoiseaux, J. S. & Greicius, M. D. (2013). Disordered reward processing and functional connectivity in trichotillomania: A pilot study. *Journal of Psychiatry Research*, *47*, 1264–1272.

Skin Picking Reward Scale

- Wilhelm, S., Keuthen, N. J., Deckersbach, T., Engelhard, I. M., Forker, A. E., Baer, L., O'Sullivan, R. L. & Jenike, M. A. (1999). Self-injurious skin picking: Clinical characteristics and comorbidity. *Journal of Clinical Psychiatry*, *60*, 454–459.
- Wyvell, C. L. & Berridge, K. C. (2000). Intra-accumbens amphetamine increases the conditioned incentive salience of sucrose reward: Enhancement of reward “wanting” without enhanced “liking” of response reinforcement. *Journal of Neuroscience*, *20*, 8122–8130.

APPENDIX

Appendix A: The Skin Picking Reward Scale

Please indicate how often the statements apply to your skin picking					
	Almost Never	Rarely	Some- times	Often	Almost Always
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Scoring instructions: Almost never = 1; Rarely = 2; Sometimes = 3; Often = 4; Almost always = 5. For liking scale scores sum items 1, 3, 5, 7, 9, and 11. For wanting scale scores sum items 2, 4, 6, 8, 10, and 12. For total score sum all items.