

Experiential avoidance as mediator between maladaptive cognitions and pathological skin picking symptom severity

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### ABSTRACT

The importance of experiential avoidance (EA) has long been recognized in psychopathology and psychotherapy. However, empirical evidence on the role of EA in pathological skin picking (PSP), is still limited. To address this gap in the literature and inform intervention, Norberg and colleagues' (2007) study was replicated using a PSP sample. Individuals reporting PSP symptoms (n=329) completed five questionnaires online: Brief Fear of Negative Evaluation (BFNE), Beliefs About Appearance Scale (BAAS), The Other as Shamer Scale (OASS), Acceptance and Action Questionnaire II (AAQ-II), and The Skin Picking Scale-Revised (SPS-R). Mediation analyses involving non-parametric bootstrapping were performed to determine whether EA mediates the relationship between (1) fear of negative evaluation and PSP symptom severity; (2) dysfunctional beliefs about appearance and PSP symptom severity; and (3) shameful cognitions and PSP symptom severity. Three separate analyses showed that EA acted as a full mediator for all three relationships. A fourth hypothesis predicting an indirect effect from PSP symptom severity to EA via maladaptive cognitions was not supported. Overall, results indicate that EA has a central role in PSP, supporting a therapeutic approach aimed at decreasing EA rather than targeting specific dysfunctional cognitions. Limitations and future areas of research are also discussed.

<b>KEY WORDS:</b>	<b>SKIN PICKING</b>	<b>MALADAPTIVE COGNITIONS</b>	<b>EXPERIENTIAL AVOIDANCE</b>	<b>SYMPTOM SEVERITY</b>	<b>MEDIATION ANALYSIS</b>
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## 1. INTRODUCTION

Skin picking (SP) was first described in 1875 by Erasmus Wilson, who observed self-inflicted excoriations in “neurotic” patients and labelled the maladaptive behaviour “neurotic excoriation” (Adamson, 1915). Since then, the condition has been referred to as pathologic skin picking, skin-picking disorder, dermatillomania, acné excoriée, psychogenic excoriation or neurotic excoriation, indicating recurrent picking of one’s skin (Grant & Stein, 2014; Odlaug et al., 2013). This paper will use the term pathologic skin picking (PSP) because it is more general and suggestive of the behaviour involved. According to its diagnostic criteria, PSP is not attributable to substance use or another dermatological, physical or psychological problem, and leads to skin damage and clinically significant distress or functional impairment (American Psychiatric Association, 2013). Recently, PSP has been classified as an independent condition in the Diagnostic and Statistical Manual of Mental Disorders 5<sup>th</sup> edition (American Psychiatric Association, 2013), where it is currently listed as “Excoriation (Skin-Picking) Disorder” in the category of Obsessive–Compulsive Spectrum Disorders.

The literature on the prevalence and phenomenology of the condition has grown during the past decade. Prevalence rates in adults and young adults vary between 1.4% and 5.4% (Monzani et al., 2012; Hayes, Storch, & Berlanga, 2009) with females reporting it more than males (Odlaug et al., 2013). In essence, the condition consists in excessive picking, scratching, rubbing, digging, or squeezing of normal skin, or skin with minor irregularities (Arnold, Auchenbach, & McElroy, 2001). The behaviour can be triggered by cutaneous stimuli (e.g., pimples, insect bites, scabs), emotions (e.g., tension, boredom, sadness) specific situations (e.g., when hands are idle, when the person is alone) or objects (e.g. magnifying mirrors) (Bohne, Wilhelm, Keuthen, Baer, & Jenike, 2002). In addition, The Milwaukee Inventory for the Dimensions of Adult Skin Picking (MIDAS) distinguishes between automatic (unconscious) and focused (deliberate) PSP (Walther, Flessner, Conelea, & Woods, 2009), although the majority of individuals are a combination of the two types, reporting that they are aware of their picking in at least 70% of the time (Tucker Woods, Flessner, Franklin, & Franklin, 2011). These phenomenological characteristics are similar across age cohorts and across cultures (Grant et al., 2012; Bohne et al., 2002) and resemble the phenomenology of trichotillomania (TTM), which involves pulling out one’s hair (Snorrason, Belleau, & Woods, 2012; Grant & Stein, 2014).

PSP has a substantial negative impact on the individual at several levels. Firstly, it can lead to sores, scarring, and occasionally to localized infections, septicaemia and disfigurement (Keuthen et al., 2000; Neziroglu, Rabinowitz, Breytman, & Jacofsky, 2008; Odlaug & Grant, 2008). Secondly, a significant number of patients report impairment in their relationships, affected academic and occupational functioning, as well as symptoms of anxiety and depression, and substance use as a means of relieving themselves of the negative feelings associated with skin picking (Tucker et al., 2011). A third but less acknowledged impact is the financial burden, as patients

spend significant amounts of money on medical professionals and medication, and especially on products that help them conceal the effects of their picking (Flessner & Woods, 2006). Despite its prevalence and negative impact, PSP has received scant research attention compared to other body-focused repetitive behaviour disorders (BFRBs) such as trichotillomania (Snorrason et al., 2012; Grant & Stein, 2014) and for this reason knowledge of the mechanisms behind PSP is still limited.

PSP has been conceptualized in several ways but most of the times its etiology and maintaining mechanisms have been discussed under the umbrella term of BFRBs, although models for psychopathology of BFRBs are primarily based on TTM literature (Roberts, O'Connor, & Bélanger, 2013). Despite the number of clinical and possibly neurobiological similarities that have been documented between TTM and PSP (Snorrason et al., 2012; Grant & Stein, 2014), such generalizations should be interpreted with caution until evidence from PSP samples is available.

One attempt to explain BFRBs is represented by the psychodynamic model. Although lacking strong empirical evidence, this model considers BFRBs as being a symbolic representation of unresolved unconscious conflicts and therefore a form of self-soothing (Gershuny et al., 2006). Behavioural models explain how BFRBs are maintained through learning, practice and repetition, in spite of seeming to be painful and having negative physical, cognitive and emotional consequences on the individual. Additionally, cognitive-behavioural models posit that the maladaptive behaviour is caused by distorted or maladaptive thoughts, which in turn are triggered by specific situations (Roberts et al., 2013). Within this general framework, several models have focused on either negative reinforcement, proposing that individuals with BFRBs have a general deficit in emotion regulation which makes them resort to maladaptive coping methods (Emotion Regulation Model; Snorrason, Smári, & Ólafsson, 2010) or on positive reinforcement, proposing that individuals with BFRBs have a different threshold for physiological stimulation and also deficits in regulating stress levels, leading to external regulation of internal states of sensory imbalance (Stimulus Regulation Model; Penzel, 2002). Other models such as the Comprehensive Behavioural Model (Stemberger, Stein, & Mansueto, 2003) have incorporated both positive and negative reinforcement. Existing evidence supports these models, with a large majority of PSP individuals retrospectively reporting increased boredom, tension or anxiety tension before picking, all of which reduce after the act (Neziroglu et al. 2008; Bohne et al. 2002). Reports also show that relief and gratification are experienced during picking (Wilhelm et al., 1999; Snorrason et al. 2010). Overall these models and evidence appear to indicate that the mechanisms maintaining BFRBs are some internal states that are experienced as unpleasant and aversive by the individual.

A different conceptualization would be that BFRBs are maintained by individuals' refusal to experience these unpleasant internal states, rather than being maintained by the aversive event itself. This is the core idea of the experiential avoidance model of psychopathology, in which experiential avoidance (EA) is defined as unwillingness to be in contact with unpleasant internal experiences such as thoughts, emotions, memories, bodily sensations, or urges/ behavioural tendencies (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). EA involves a process of using seemingly maladaptive behaviours to escape, avoid or alter these unwanted experiences. Although these strategies can be effective in some contexts, the behaviour becomes

problematic when it is employed in spite the fact that it does not actually help and interferes with personal values and goals (Hayes et al., 1996, Boulanger, Hayes, & Pistorello, 2010). In PSP, experiential avoidance is achieved through recurrent and excessive skin picking, which appears to decrease boredom, anxiety and tension and offer relief and gratification (Snorrason, et al., 2012). In line with the EA model, although picking may be temporarily effective in diminishing some unpleasant psychological experiences, this reduction is accompanied by increased embarrassment, guilt and shame, as well as tissue damage and functional impairment (Roberts et al., 2013).

Experiential avoidance is believed to stem from the bidirectional function of human language and cognition (Blackledge & Hayes, 2001), which implies that not only can experiences of events be translated into verbally based representations, but symbolic representations can too give rise to that particular experience (Hayes et al., 1996). In this context, cognition becomes a source of potential cues for danger, which motivates the individual to avoid these internal cues. This process is similar to the motivation of avoiding external cues of danger, which has been studied extensively in studies exposing animals to different negative experiences such as electric shocks and showing that the animal learns to avoid external cues associated with the negative event (e.g. a certain chamber/ sound), in order to escape/ prevent the unpleasant experience (Chawla & Ostafin, 2007).

The experiential avoidance model has received increasing attention during the past few years, although the importance of EA has long been recognized both in psychopathology and therapy (Boulanger et al., 2010). An extensive body of literature details the presence of cognitive and affective strategies such as thought/ emotional suppression, avoidance coping, reappraisal and self-deception, all of which can be regarded as experiential avoidance (Chawla & Ostafin, 2007). However, as a theoretical concept, EA has been argued to be more useful than the aforementioned concepts, due to its being a functional category related to processes that are contextually specific and manipulable (Boulanger et al., 2010). In their seminal article, the first comprehensive review of EA, Hayes and colleagues (1996) argued for a functional as opposed to syndromal classification of forms of psychopathology, proposing that disorders be placed on different functional dimensions rather than in different categories based on their topographical differences. It has been argued that such an approach could help determine a common underlying function in apparently disparate problematic behaviours and allow intervention (Hayes et al., 1996). One of these dimensions is experiential avoidance, which has been found to be related with a number of different psychological disorders and to act as mediator between symptoms and different psychological constructs (Ruiz, 2010). Experiential avoidance, as measured by the Acceptance and Action Questionnaire (AAQ; Hayes, Strosahl, Wilson, & Bissett, 2004), appears to account for 16-28% of variance in behavioural health conditions (Boulanger et al., 2010). It has also been found to be strongly correlated with measures of depression, anxiety, substance abuse, post-traumatic stress disorder symptomatology, deliberate self-harm, intolerance of chronic pain, trichotillomania, and phobic fear among different areas (Hayes, Luoma, Bond, Masuda, & Lillis, 2006).

Reflecting the theoretical conceptualizations of PSP, the first-line intervention in PSP – as well as in TTM - (Grant & Stein, 2014) has been, for many years, habit reversal training (HRT; Azrin & Nunn, 1973), a behavioural approach which involves awareness training, competing response training, and social support. The efficacy of HRT in reducing skin picking has been supported by several case studies and group-design studies (e.g., Kent & Drummond, 1989; Rosenbaum & Allyon, 1981; Teng, Woods, & Twohig, 2006; Twohig & Woods, 2001). However, HRT does not address the aversive internal events which, according to the cognitive-behavioural model, trigger the maladaptive behaviour (Woods et al., 2006). Attempts have been made therefore to add cognitive change procedures to the HRT protocol (e.g., Lerner, Franklin, Meadows, Hembree, & Foa, 1998; Pelissier & O'Connor, 2004; Rangaswami, 1997; Deckersbach, T., Wilhelm, S., Keuthen, N. J., Baer, L., & Jenike, 2002). Partly because treatment gains were not complete and often not maintained, and partly because of the emerging evidence on the potential role of experiential avoidance in psychopathology (Hayes et al., 2006), interventions in both PSP and TTM began to include in their protocols the Acceptance and Commitment Therapy (ACT) - a behaviour analytic psychotherapy that specifically targets experiential avoidance.

The ACT name suggests its core themes: acceptance of unwanted private events and pursuit of one's values and goals. ACT is part of the so-called "third wave" in behavioural and cognitive therapy and addresses experiential avoidance through techniques which increase psychological flexibility, or the ability to allow inner experiences to occur and change or persist in behaviour with no attempts to regulate them. When ACT is used in combination with HRT in BFRBs, the combined treatment is often referred to as acceptance-enhanced behavior therapy (AEBT). In trichotillomania, a 7-week combined HRT and ACT protocol led to an average of 63% decrease in hair pulling severity posttreatment in four of the six adult participants, and three of those who responded to treatment maintained the results at the 3-month follow-up (Twohig & Woods, 2004). Additionally, AAQ scores were found to decrease. Similarly, a randomized controlled trial comparing AEBT for TTM to a wait-list found that the 10-session treatment increased significantly psychological flexibility (i.e. decreased experiential avoidance), and reduced significantly HP symptom severity, impairment and hairs pulled per day (Woods, Wetterneck, & Flessner, 2006). These results have been supported by subsequent studies showing that the AEBT approach results in a 65.3% (Flessner, Busch, Heideman, & Woods, 2008) and 88.87% (Crosby, Dehlin, Mitchell, & Twohig, 2012) TTM symptom reduction across participants from pretreatment to posttreatment. However, these involved only three, respectively five, participants.

Three pilot studies have also found improvements in PSP symptoms after targeting experiential avoidance via ACT. In one study using a multiple-baseline across participants design (Twohig, Hayes, & Masuda, 2006), four out of five college students reduced their skin picking almost to zero-level, following an eight-session ACT protocol, although only one out of the four who responded to treatment maintained the gains at 3 months follow-up. In a second study (Flessner et al., 2008), two individuals with skin picking following AEBT showed a 49.5% symptom reduction. More recently, Capriotti, Ely and Snorrason (2015) reported marked decreases in symptoms following AEBT in three adults with PSP, while a fourth participant showed a relapsing-and-remitting pattern. Overall, results from these

studies are promising, indicating substantial treatment gains and supporting the experiential avoidance model in PSP. However, they show that interventions are yet to offer 100% successful, complete recovery (Twohig & Smith, 2015). A reason for this might be the fact that research in PSP is still in its infancy, and especially the fact that experiential avoidance - the main aspect targeted in ACT therapy - has received limited empirical attention in PSP.

In TTM, experiential avoidance was found to be positively correlated with the severity of the condition (Begotka, Woods, & Wetterneck, 2004). Also, Norberg and colleagues (2007) found that experiential avoidance fully mediated the relation between fear of negative evaluation and symptom severity; and the one between and shameful cognitions and symptom severity; and partially mediated the relation between dysfunctional beliefs about appearance and symptom severity (Norberg et al., 2007). More recently, mediation analysis involving emotional variables such as anxiety or depression found similar patterns (Houghton et al., 2014). When the role of EA was investigated in a PSP sample, it was found to be positively correlated with skin picking symptom severity and to partially mediate the relationships between symptoms of anxiety and depression, and skin picking severity (Flessner & Woods, 2006). However, no study investigated EA in relation to maladaptive cognitions and the severity of PSP symptoms. Such an investigation would be an important step towards designing treatments based on an empirically derived model.

Expanding on Flessner and Woods' (2006) work on emotions and replicating Norberg et al.'s (2007) study using a PSP sample, the present study investigated experiential avoidance in relation to maladaptive cognitions and PSP symptom severity in self-reported skin picking individuals. To the best of the author's knowledge, no published study has attempted to address this gap in the PSP literature. In this context, the primary goal of the present study was to investigate whether experiential avoidance mediates any of the relationships between (1) fear of negative evaluation, (2) dysfunctional beliefs about appearance, (3) shameful cognitions, and PSP symptom severity. While the choice of experiential avoidance as potential mediator is supported by the short literature review provided in the *Introduction*, the choice of the three cognitive measures deserves further argumentation.

One of the main reasons for investigating fear of negative evaluation, dysfunctional beliefs about appearance and shameful cognitions was their higher levels in individuals with TTM compared to normal population (Norberg et al., 2007). Since individuals with TTM and PSP are similar in various clinical aspects (Snorrason et al., 2012) and personality dimensions, (Lochner, Simeon, Niehaus, & Stein, 2002), the three measures were considered strong candidates for the cognitive experiences involved in PSP. The inclusion of these constructs was also supported by research conducted on PSP samples, showing that a desire to improve appearance, perfectionism, shame, low self-esteem, and feelings of unattractiveness (Bohne et al., 2002; Neziroglu et al., 2008; Keuthen et al., 2000; Snorrason et al., 2010; Wilhelm et al., 1999) are common motives among these individuals. PSP also appears to be related to the social context, with individuals reporting picking most often when they are alone, which could indicate a fear of being negatively evaluated (Bohne et al., 2002). In addition, the choice was supported by the marked preoccupation with one's body, which is characteristic of PSP. Lastly, focusing on

the same three cognitive constructs investigated by Norberg et al. (2007) enabled a descriptive comparison between PSP and TTM in this respect.

In this study, none of the three predictors were determined through manipulation and random assignment, which leaves the possibility open for any sequence of causal ordering of X, M and Y (Hayes, 2013). When other sequences were entertained as potential candidates for the direction of causal flow, a model in which more severe symptoms of PSP predicted higher levels of maladaptive cognitions which in turn predicted higher levels of experiential avoidance seemed particularly probable. The theoretical support for this hypothesis lies in the same EA model of psychopathology (Hayes et al., 1996) which posits that the individual with the condition is unwilling to remain in contact with these aversive experiences (i.e. higher levels of negative evaluation, dysfunctional beliefs about appearance and shameful cognitions would predict higher levels of EA) and also that the maladaptive behaviour may increase the frequency and saliency of the event the person is trying to escape from or avoid (i.e. more severe PSP symptoms would predict higher levels of negative evaluation, dysfunctional beliefs about appearance and shameful cognitions). This model was examined because of its potential to explain variation in EA levels, which was of interest given its hypothesized importance in PSP.

In this context, the second part of the analysis consisted of estimating a mediation model corresponding to this plausible route, in order to determine whether this alternative order is supported by the resulting direct and indirect effects. This practice has been previously adopted by other studies testing mediation models (e.g. Bizer, Hart, & Jekogian, 2012; Osborne & Taylor, 2010; Luksyte & Avery, 2010; Morano, Colella, Robazza, Bortoli & Capranica, 2011). Thus, based on the theoretical and empirical work reviewed above, it was hypothesised that:

- I. Experiential avoidance mediates the relationship between (1) fear of negative evaluation and PSP symptom severity, (2) dysfunctional beliefs about appearance and PSP symptom severity, and (3) shame-related cognitions and PSP symptom severity.
- II. The relation between PSP symptom severity and experiential avoidance will be mediated by fear of negative evaluation, dysfunctional beliefs about appearance, as well as by shame-related cognitions (4).

## **2. METHOD**

### **2.1. Participants**

Participants were recruited through an online survey posted on three separate Facebook pages targeting persons with PSP. A total of 329 individuals self-reporting PSP symptoms completed the online survey. All participants confirmed that they met the following inclusion criteria: (1) endorsing symptoms of Excoriation (Skin Picking) Disorder; (2) being 17 years or older; and (3) fluent in English. All 329 cases were analyzed as no duplicates were found.

The sample included 323 (92%) females and 8 (3%) males (18 preferred not to answer), with a mean age of 33.92 years (SD = 11.86; range, 18 to 69). The ethnicity of the sample was largely White/Caucasian (88%), followed by Hispanic/Latino, Multiracial, Asian, African-American, and other. Only 25% of the participants were married or living in domestic partnership, with the rest being single, divorced, separated or widowed. The level of education and especially the annual household income varied considerably across the sample. The majority of participants (66%) were self-reported, with the others having received a PSP diagnosis from different types of mental health practitioners. A number of 204 participants (62%) reported having another psychological diagnosis that was still applicable. Further details about clinical aspects and the demographic composition of the sample are reported in Table 1. The institutional review board of the University of Glasgow approved the study.

**Table 1**  
**Demographic and clinical characteristics of the sample**

<b>Question</b>	<b>Characteristic</b>	<b>N</b>	<b>(%)</b>
<b>Gender</b>	Female	303	91.80%
	I prefer not to answer this question	18	5.50%
	Male	9	2.70%
<b>Ethnicity</b>	White/ Caucasian	290	88%
	Hispanic/ Latino	16	4.80%
	Multi-racial	14	4.20%
	Asian	4	1.20%
	African-American	3	0.90%
	Other	3	0.90%
	Native American or American Indian	0	0%
Hawaiian/ Pacific Islander	0	0%	
<b>Highest level of education completed</b>	High school or GED equivalent	122	37.10%
	Bachelor's degree high school	93	28.30%
	Technical college/ Associate degree	50	15.20%
	Master's degree	32	9.70%
	Did not graduate high school	27	8.20%
	Doctoral degree	5	1.50%
<b>Marital status</b>	Single, never married	220	67.30%
	Married or domestic partnership	83	25.40%
	Divorced	17	5.20%
	Separated	5	1.50%
	Widowed	2	0.60%
<b>Annual household income</b>	< 9999	61	19.60%
	30–49,000	58	18.60%
	10–19,000	54	17.40%

	20–29,000	52	16.70%
	> 76,000	47	15.10%
	50–75,000	39	12.50%
<b>Type of mental health practitioner who provided the PS diagnosis</b>	I am a self-reported skin-picker	216	65.90%
	Psychiatrist	34	10.40%
	Physician	27	8.20%
	Psychologist	23	7%
	Therapist/ Counselor	21	6.40%
	Other type of mental health practitioner	7	2.10%
<b>Other psychological diagnosis</b>	Yes (still applicable)	204	62.20%
	No	107	32.60%
	Yes (no longer applicable)	17	5.20%

## 2.2. Assessment Instruments

### Demographics Questionnaire

Participants were asked to provide brief demographic and clinical information as listed in the *Question* column in Table 1. Age and gender were the only two compulsory questions in this section and in the survey as a whole. However, for the gender item, participants could select the option “I prefer not to answer this question”.

### Skin Picking Scale Revised (SPS-R)

Severity of PSP was assessed using the revised version of the Skin Picking Scale (SPS-R; Snorrason et al., 2012) which distinguishes between symptom severity and impairment. SPS-R is an 8-item self-report measure that evaluates frequency of urges (i.e. desire to pick), intensity of urges, time spent picking, self-control over skin picking, associated distress, interference, avoidance and skin damage due to skin picking. In other words, the first 4 items measure symptom severity whereas the last 4 items measure impairment. The SPS-R asks respondents to use 5-point Likert scales ranging from 0 (none) to 4 (extreme). The scale yields a total score ranging from 0 to 32, as well as two sub-scores, each ranging from 0 to 16, with higher scores indicating greater symptom severity/ impairment. The mean SPS-R total score, and the sub-scores for symptom severity and impairment in a clinical sample were 15.48 ( $SD = 4.92$ ), 8.61 ( $SD = 2.69$ ) and 6.90 ( $SD = 2.95$ ) respectively. The SPS-R has demonstrated acceptable internal consistency of the total score ( $\alpha = .83$ ), as well as symptom severity ( $\alpha = 0.81$ ) and impairment ( $\alpha = 0.79$ ) subscales (Snorrason et al., 2012). In the current sample of participants the overall internal consistency of the scale was good ( $\alpha = .83$ ), and acceptable for the symptom severity ( $\alpha = .80$ ) and impairment ( $\alpha = .79$ ) subscales. Different from Norberg and colleagues' (2007), the present study chose to employ the Revised Skin Picking Scale due to its three main advantages over the original SPS (Keuthen et al., 2001): it has clearer factor structure, the ambiguous item referring to distress has been rephrased as emotional distress in SPS-R; and two additional items assessing

controllability and skin damage have been included, capturing better the phenomenology of the condition (Snorrason et al., 2012).

### **Brief Fear of Negative Evaluation (BFNE)**

The Brief Fear of Negative Evaluation Scale (BFNE; Leary, 1983) is a 12-item cognitive measure of social anxiety, derived from the 30-item Fear of Negative Evaluation (FNE) Scale (Watson and Friend, 1969). The respondent indicates the extent to which each item is characteristic of himself or herself on a Likert Scale ranging from 1 (“Not at all”) to 5 (“Extremely”). The measure yields total scores ranging from 12 to 60, with higher scores indicating greater concern with seeking social approval or avoiding disapproval by others. Eight items describe the presence of fear or worrying cognition (positively scored items) such as “I am afraid others will not approve of me.” The remaining four items describe the absence of fear or worrying cognition (reverse scored items) such as “Other people's opinions of me do not bother me.” The mean BFNE score in non-clinical college samples has been reported to be 35.70 ( $SD = 8.10$ ; Leary, 1983). Leary (1983) reported high internal consistency ( $\alpha = .90$ ) and acceptable four-week test–retest reliability ( $r = .75$ ). More recently, studies found excellent internal consistency for the positively scored factor ( $\alpha = .94$ ), acceptable for the negatively scored factor ( $\alpha = .73$ ), and good full BFNE Scale ( $\alpha = .80$ ; Duke, Krishnan, Faith, & Storch, 2006). In the present study, the BFNE Scale ( $\alpha = .90$ ) and the set of positively scored items ( $\alpha = .91$ ) displayed excellent internal consistency, whereas for the negatively scored items, internal consistency was acceptable ( $\alpha = .72$ ).

### **Beliefs about Appearance Scale (BAAS)**

The Beliefs about Appearance Scale (BAAS; Spangler & Stice, 2001) was used to measure dysfunctional beliefs about physical appearance. This is a 20-item, self-report instrument that uses 5-point Likert scales (where 0 = “not at all” and 4 = “extremely”). Scores are summed to create a total score ranging from 0 to 80, with higher scores indicating higher tendency to place emphasis on appearance. The scale includes items such as “People will think less of me if I don’t look my best”, reflecting the extent to which the respondent feels that his/her physical appearance impacts on different domains. The mean BAAS score in non-clinical college samples ranges between 23.34 ( $SD = 14.86$ ) and 30.57 ( $SD = 18.02$ ; Spangler, 1999). Previous evaluations of the BAAS have reported high internal consistency ( $\alpha = .95$ ), and test–retest reliability ( $r = .83$ ; Spangler & Stice, 2001). The present sample yielded the same excellent internal consistency ( $\alpha = .95$ ).

### **The Other as Shamer Scale (OASS)**

Shame was measured using the The Other as Shamer Scale (OASS; Goss, Gilbert, & Allan, 1994). The OASS is an 18-item self-report measure of an individual’s beliefs about how the self is evaluated by others. Respondents rate the frequency of evaluations such as “I think that other people look down on me” on 5-point Likert scales (never, seldom, sometimes, frequently, almost always). Scores can range from 0 to 72, with higher scores indicating higher external shame. The mean OASS score in a non-clinical college sample was 20.0 ( $SD = 10.1$ ; Goss et al., 1994). Previous evaluations of the OASS demonstrated satisfactory test-retest reliability

(Balsamo et al., 2015). Internal consistency was assessed for the present sample and was found to be excellent ( $\alpha = .92$ ).

### **Acceptance and Action Questionnaire II (AAQ-II)**

The AAQ-II is a 7 item, self-report measure of experiential avoidance, defined as a person's tendency to escape from or avoid unpleasant private experiences as well as their attempts to alter these psychological events (Bond, 2003). The questions load onto a single factor, but measure a range of different constructs, including need for emotional/ cognitive control, avoidance of negative private experiences, inability to deal effectively with private events, excessively negative evaluations of private experiences or negative self-evaluations (Hayes et al., 2004). The participant rates each item on a 7-point Likert-type scale (where 1 = "never true" and 7 = "always true"), based on the degree to which the participant believes that each item pertains to them (e.g. "It seems like most people are handling their lives better than I am"). Total scores can range from 7 to 49, with higher scores indicating higher levels of experiential avoidance, whereas low scores indicate greater willingness/ability to experience/act in the presence of aversive thoughts and feelings. AAQ-II scores that range from 24 to 28 can be indicative of psychopathology, whereas a mean AAQ-II score of 18.51 ( $SD = 7.05$ ) is characteristic of non-clinical samples (Bond et al., 2011). The 3- and 12-month test-retest reliability is .81 and .79, respectively. The internal consistency is also good ( $\alpha = .78-.88$ ; Bond et al., 2011), similar to the one found in the present study ( $\alpha = 0.89$ ). Different from the original study (i.e. Norberg et al., 2007) which used the AAQ, the present study chose to use the AAQ-II because the two scales measure the same concept ( $r = .97$ ) but AAQ-II is less time consuming and has a better psychometric consistency (Bond et al., 2011).

### **2.3. Procedure**

The survey link operated online for 90 consecutive days from October 2015 through January 2016. First, participants were directed to an information page which provided details of the study such as purpose, procedure and requirements for participation, as well as information regarding the anonymous and voluntary nature of their participation, their right to withdraw at any time without penalty and omit any questions they did not want to answer. It was also stated that participation did not imply any direct benefit such as payment or course credits. Participants gave their informed consent and confirmed that they met the inclusion criteria described in the beginning of the Method. Violation of any of these criteria prevented the participant from proceeding to the actual survey. The completion of the demographic questions together with the five blocks of questions measuring (1) shameful cognitions; (2) dysfunctional beliefs about appearance; (3) fear of negative evaluation; (4) experiential avoidance; and (5) symptom severity, took approximately 15 minutes and varied in location for the participants' convenience. In the end of the study, participants were debriefed and reminded that they could contact the researchers for further information regarding the study. All answers received a time label upon submission but they were completely anonymous. The electronic database of the surveys was stored in a private Google drive account which only the two researchers had access to.

## 2.4. Data Analysis

All responses were downloaded in excel format and analyzed using the Statistical Package for the Social Science version 22.0 for Windows (SPSS, 2013). The sample size of the present study (N=329) was larger than the ones reported by 68.8 % of studies testing mediation (Fritz & MacKinnon, 2007). In fact, only 25.4% of mediation studies conducted by 2010 had sample sizes over 350 participants (Fritz & MacKinnon, 2007). Considering studies that have examined the role of experiential avoidance in the etiology, maintenance, and treatment of different psychological conditions, the sample of the present study exceeds the 19 – 304 participants range reported in a review paper by Chawla & Ostafin (2007).

Internal consistency of the five scales used in the study and their subscales was measured with Cronbach's alpha. Non-response items were handled via multiple imputation method. In addition to those already presented in Table 1, descriptive analyses included means (*M*) and standard deviations (*SD*) for all the psychological constructs measured on BFNE, BAAS, OASS, AAQ-II, SPS-R (and its subscales). Zero-order correlations for these variables and age were also examined.

Different from Norberg and colleagues' (2007) who used Baron and Kenny's (1986) Causal Step Approach, the mediation analyses conducted in the present study relied on testing the indirect effects directly via a non-parametric bootstrapping technique using the PROCESS macro for SPSS (Hayes, 2015). At present, the procedure is strongly recommended over the popular Baron and Kenny (1986) method and generally preferred over others (Preacher and Hayes, 2008). Baron and Kenny's approach has been criticised for high Type I error rate, qualitative description of the indirect effect, low statistical power and logical pitfalls in some of the assumptions (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002; Hayes, 2013). In contrast, the bootstrap method does not require a normal sampling distribution, has the best balance of Type I error rate and statistical power, and gives a more precise picture of the mediation by quantifying the indirect effect (see Hayes, 2013 for a discussion).

Mediation occurs when the path from X to Y (path *c*) runs through M (i.e. the mediator). When there is both a direct (*c'*) and an indirect (*ab*) path from the predictor variable to the outcome, partial mediation is said to exist in the model, whereas models in which there is no direct path from X to Y are characterized by full mediation (Hayes, 2013). In this study, the indirect effect (path *ab*) was the product of the effect of the independent variable (fear of negative evaluation, dysfunctional beliefs about appearance or shameful cognitions) on the mediator (experiential avoidance; i.e., path *a*) and the effect of the mediator on the dependent variable (PSP symptom severity; i.e., path *b*). Following Hayes's (2013) recommendations, the mean unstandardized indirect effect, direct effect, and total effect were calculated using 10000 bootstrap resamples and 95% bias-corrected confidence interval (BC CIs). Specifically, ten thousand random samples were taken from the original sample, replacing each value as it was sampled. The indirect effect was computed in each of these samples, thus allowing the estimation of a 95% BC CIs of the indirect effect of the model. The non-parametric bootstrapping technique of testing mediation does not provide a p-value. Instead, the indirect effect is considered statistically significant at the .05 level if zero is not contained in the 95% CI. This procedure was followed in all mediation analyses conducted in this study. Effect sizes were reported

as completely standardized indirect effect of the predictor variable on the outcome variable ( $ab_{cs}$ ).

### 3. RESULTS

#### 3.1. Descriptive statistics and bivariate correlations

Descriptive statistics and bivariate correlations are presented in Table 2. Compared to previous work on PSP and TTM (and accounting for the total number of items each scale has), the present sample showed similar levels of overall severity of the condition (Snorrason et al., 2012; Keuthen et al., 1995). Average scores of both experiential avoidance ( $M = 34.05$ ;  $SD = 8.14$ ) and PSP severity ( $M = 17.05$ ;  $SD = 4.49$ ) indicated that the sample was situated in the clinical range. Similarly, average scores in each of the three categories of maladaptive cognitions (i.e. fear of negative evaluation, dysfunctional beliefs about appearance and shameful cognitions) exceed by approximately 10 points the means reported in non-clinical samples in the literature (Leary, 1983; Spangler, 1999, Goss et al., 1994).

Examination of the data also revealed that, compared to individuals with TTM in the original study (Norberg et al., 2007), self-reported PSP individuals scored higher on all three measures of maladaptive cognitions (i.e. BFNE; BAAS; OASS) as well as in experiential avoidance (AAQ-II). As expected, significant positive bivariate correlations ( $p < 0.01$ ) were found between all 5 measures of interest, including the two subscales of SPS-R. Significant negative correlations were also found between age and shameful cognitions, and experiential avoidance respectively. The remaining analyses controlled for age.

**Table 2**  
Pearson product–moment correlation coefficients between the 5 main measures, as well as SPS-R sub-scores and age

Measure	1	2	3	4	5	6	7	8
1 BFNE								
2 BAAS	.43**							
3 OASS	.53**	.47**						
4 AAQ	.39**	.49**	.63**					
5 SPS-R	.18**	.33**	.26**	.40**				
6 SPS-R (s.s)	.13*	.14**	.17**	.28**	.85**			
7 SPS-R (i)	.17**	.42**	.274**	.39**	.87**	.46**		
8 Age	-.05	-.05	-.15**	-.14**	.02	-.41	.07	
<i>M</i>	46.04	49.17	35.15	34.05	17.05	9.72	7.33	
<i>SD</i>	8.75	16.47	12.57	8.14	4.49	2.54	2.71	

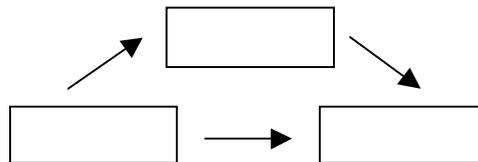
Note: \*\* Correlation is significant at the 0.01 level (2-tailed).

SPS-R (s.s) = symptom severity subscale of SPS-R

SPS-R (i) = impairment subscale of SPS-R

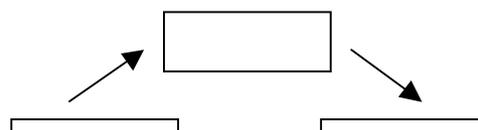
### 3.2. Mediation analyses

Since the focus of the present study was experiential avoidance rather than the specific negative private experiences, the hypothesised models were tested independently, as opposed to entering the three predictors simultaneously into a multiple predictor model. A simple mediation analysis revealed that experiential avoidance fully mediated the relation between fear of negative evaluation and PSP symptom severity. A 95% bias-corrected bootstrap confidence interval for the indirect effect ( $ab = .031$ ,  $ab_{cs} = .105$ ) based on 10000 bootstrap samples was entirely above zero (.016 to .050), suggesting that the indirect effect from FNE to PSP through experiential avoidance is positive to a statistically significant degree. The reported effect size indicates that a difference of one SD in fear of negative evaluation between two individuals is estimated to have a corresponding difference of .105 SD in PSP symptom severity, resulted from the effect of fear of negative evaluation on experiential avoidance, which then influenced the severity of the symptoms. There was no evidence that fear of negative evaluation influenced symptom severity directly ( $c' = .007$ ,  $p = .670$ ). According to these results, elevated fear of negative evaluations predicts less willingness to experience unpleasant internal events, which ultimately predicts more severe symptoms of PSP. Thus, hypothesis 1 was supported. The conceptual diagram is presented in Figure 1.



**Figure 1: Conceptual diagram for model 1, representing the theoretical associations among fear of negative evaluation, experiential avoidance and PSP symptom severity**

The same procedure was used to test the other two models illustrated in Figure 2 and Figure 3. The simple mediation analysis conducted on the second model found support for hypothesis 2, showing that EA fully mediated the relation between dysfunctional beliefs about appearance and PSP symptom severity. The confidence interval for the indirect effect ( $ab = .021$ ;  $ab_{cs} = .135$ ) was entirely above zero (.011 to .033), suggesting that the indirect effect from dysfunctional beliefs about appearance to PSP through EA is positive to a statistically significant degree. There was no evidence that dysfunctional beliefs about appearance influenced symptom severity directly ( $c' = .001$ ,  $p = .903$ ). According to these results, elevated levels of dysfunctional beliefs about appearance predict less willingness to remain in contact with internal aversive states, which ultimately predicts more severe symptoms of PSP.

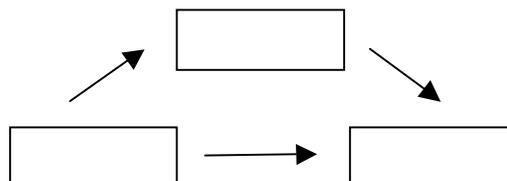


OASS

SPS-R

**Figure 2: Conceptual diagram for model 2, representing the theoretical associations among dysfunctional beliefs about appearance, experiential avoidance and PSP symptom severity**

In the third model examined, the simple mediation analysis revealed that experiential avoidance fully mediated the relation between shameful cognitions and PSP symptom severity. The confidence interval for the indirect effect ( $ab = .037$ ;  $ab_{cs} = .180$ ) was entirely above zero (.019 to .057), suggesting that the indirect effect from shameful cognitions to PSP symptom severity through experiential avoidance is positive to a statistically significant degree. There was no evidence that shameful cognitions influenced symptom severity directly ( $c' = -.003$ ,  $p = .830$ ). According to these results, elevated levels of shameful cognitions predict less willingness to experience unpleasant internal events, which ultimately predicts more severe symptoms of PSP. Thus, hypothesis 3 was supported. The path diagram is presented in Figure 3.+-

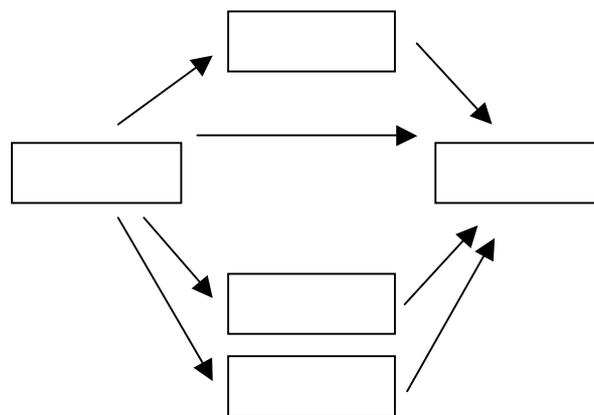


**Figure 3: Conceptual diagram for model 3, representing the theoretical associations among shame-related cognitions, experiential avoidance and PSP symptom severity**

The second part of the analysis tested hypothesis 4 in which the model had PSP symptom severity predicting higher levels of fear of negative evaluation, dysfunctional beliefs about appearance and shame-related cognitions, which in turn were expected to predict increased levels of EA (Figure 4). This hypothesis was tested within a parallel (as opposed to serial) multiple-mediator model because at the time of writing it was unknown in the literature if and how these constructs influenced one another among individuals with PSP symptoms. Since impairment (i.e. extent of tissue damage and psychosocial impairment as measured by the SPS-R impairment subscale) was found to be positively correlated with BFNE, BAAS and OASS scores, as well as AAQ scores (see Table 2), this variable was also controlled for, in addition to age, to avoid confounding effects (see Hayes, 2013 for a discussion).

Results from the mediation analysis conducted on the parallel three-mediator model showed that fear of negative evaluation, dysfunctional beliefs about appearance and shameful cognitions did not mediate the relation between PSP symptom severity and experiential avoidance. The 95% bias-corrected bootstrap confidence interval for the total indirect effect ( $ab = .023$ ,  $ab_{cs} = .007$ ) summed across the three mediators and based on 10000 bootstrap samples included zero (-.211 to .276), suggesting that the

indirect effect from PSP symptom severity through fear of negative evaluation, dysfunctional beliefs about appearance and shameful cognitions is not positive to a statistically significant degree. Zero was also contained by the confidence intervals for the specific indirect effect from fear of negative evaluation ( $ab = .006$ , BC CI [-.013 to .067],  $ab_{cs} = .002$ ), dysfunctional beliefs about appearance ( $ab = -.041$ , BC CI [-.135 to .022],  $ab_{cs} = -.013$ ) and shameful cognitions ( $ab = .058$ , BC CI [-.133 to .255],  $ab_{cs} = .018$ ), suggesting that none of these cognitive variables acted as mediator. The direct effect from PSP symptom severity to EA was however significant ( $c' = 0.337$ ,  $p = .021$ ). These results do not support hypothesis 4, indicating a direct rather than indirect effect from PSP symptom severity to EA. Overall, the results of this study support the view that EA plays a key role in the severity of PSP symptoms, suggesting at the same time the existence of a feedback mechanism, with more severe symptoms predicting higher levels of EA.



**Figure 4: Conceptual diagram for the three-mediator model, representing the theoretical associations among PSP symptom severity, different maladaptive cognitions and experiential avoidance**

#### 4. DISCUSSION

The present study investigated the role of experiential avoidance in PSP. Three separate mediation analyses using non-parametric bootstrapping found support for hypotheses 1, 2 and 3, showing that experiential avoidance fully mediated the relationship between (1) fear of negative evaluation and PSP symptom severity; (2) dysfunctional beliefs about appearance and PSP symptom severity; and (3) shameful cognitions and PSP symptom severity. No support was found for hypothesis 4, which had predicted that these cognitions would mediate the relationship between PSP symptom severity and experiential avoidance. Nevertheless, there was a significant positive direct effect from symptom severity to EA.

Results supporting hypotheses 1, 2 and 3 are in line with results showing that EA partially mediates the relationships between symptoms of anxiety and depression, and PSP severity (Flessner & Woods, 2006). Present results are also in accordance with findings in other clinical areas, which showed that experiential avoidance is

related with several psychological conditions such as depression, anxiety, substance abuse, post-traumatic stress disorder symptomatology, deliberate self-harm, intolerance of chronic pain, trichotillomania, and phobic fear (Hayes et al., 2006). More importantly, the results of the current study are broadly in line with those obtained previously in a TTM sample (Norberg et al., 2007). The only difference was that the present study found EA to be a full mediator of the relationship between dysfunctional beliefs about appearance and PSP symptom severity, while Norberg and colleagues (2007) reported a partial mediation. In other words, their study found both a direct effect from dysfunctional beliefs about appearance to TTM severity, and an indirect one via EA. While this slight discrepancy could indicate a difference between PSP and TTM, it could be due to the finer analysis conducted in the present study, which employed a bootstrapping approach (Preacher and Hayes, 2008) as opposed to classical Baron and Kenny's (1986) Causal Step Approach, and measured symptom severity in particular as opposed to overall severity.

Overall, the results from models 1, 2, and 3 support the EA model in PSP, according to which symptoms would be fuelled by the attempts to control the negative internal states rather than by the content of the experience itself. Specifically, results showed that negative internal states such as fear of negative evaluation, dysfunctional beliefs about appearance and shameful cognitions predict less willingness to experience unpleasant internal events, which ultimately predicts more severe symptoms of PSP. With no direct effects from maladaptive cognitions to PSP symptom severity being found, present results do not support the cognitive-behavioural models which posit that the maladaptive behaviour is triggered by the mere existence of the negative inner experience (Roberts et al., 2013).

The fact that the model found a significant direct effect from PSP symptom severity to EA levels is in line with studies finding significant positive correlations between levels of experiential avoidance and the severity of PSP (Flessner & Woods, 2006), TTM (Begotka et al., 2004; Houghton et al., 2014) or other psychological conditions (Hayes et al., 2006). There are two potential explanations as to why this effect was not mediated by any of the three categories of maladaptive cognitions. Firstly, the negative internal events that the person is unwilling to be in contact with (e.g. aversive thoughts and beliefs) might increase in frequency and saliency only after the skin picking behaviour has been performed for a relatively long period of time (Hayes et al., 1996). This time variable is not necessarily reflected in the scores measuring the severity of the condition, especially since PSP shows fluctuations in severity (Flessner & Woods, 2006). Secondly, the present analysis involved symptom severity scores, as opposed to a specific measure of the amount of time spent picking. Future studies attempting to clarify this aspect could employ longitudinal measurements or collect data on the onset time of the condition, as well as conduct a fine-grain analysis using the score on item 3 in the Revised Skin Picking Scale (SPS-R; Snorrason et al., 2012) which reflects the amount of time spent picking.

The fact that the direct effect was positive to a statistically significant degree indicates the presence of a feedback mechanism. Specifically, the results show that not only high levels of EA predict more severe SP symptom severity, but also the severity of the symptoms can explain individuals' unwillingness to experience aversive private events. Such a positive loop would be in accordance with studies

documenting the persistence of the condition, with symptom duration ranging between 5 and 20 years (Grant et al., 2012). Specifically, it could be that once the individual has developed the condition, experiential avoidance will increase with the severity of the symptoms. With EA playing a central role in PSP symptom severity, it would not be difficult to entertain the idea of this turning into a vicious circle. Since no study has investigated the possibility of this bidirectionality in PSP, current results should be regarded as preliminary findings awaiting validation from future research.

Apart from these theoretical implications, the current study has practical implications as well. The results do not support the idea of changing the aversive experiences. In stark contrast, they support an EA model of PSP and indicate that Acceptance and Commitment Therapy (ACT) could be an effective intervention in PSP. Indeed, the potential of ACT to reduce PSP symptoms has already been indicated by three pilot studies involving ACT (Twohig et al., 2006; Flessner et al., 2008; Capriotti, et al., 2015), which showed significant reductions in levels of picking in most of the PSP participants. So far, no other results have been reported, possibly due to a general agreement among researchers and clinicians on the need to make additions or modifications to the existing protocol in order to enhance maintenance of gains, and the need of large randomized controlled trials (Teng et al., 2006; Twohig et al., 2006; Gelinias & Gagnon, 2013; Tucker et al., 2011; Flessner et al., 2008). The ACT approach to skin picking is also supported by the results in the second part of the analysis. Specifically, the existence of a feedback mechanism from symptom severity to EA levels could mean that EA would not only be decreased as a result of ACT therapy but also as the severity of the PSP symptoms will decrease, possibly potentiating the effectiveness of the intervention. However, the correlational nature of this study constrains the interpretations it can support. In particular, causal claims cannot be made based on the current findings. This represents one of the limitations to be discussed next.

In spite of its theoretical and clinical implications, this study has several limitations that need to be considered and addressed in future research. The first one concerns the direction of causal order. Although the mediation model is a causal model, the causal relationships are not always empirically demonstrated and might rely on theoretical accounts (Hayes, 2013). This was the case both in the present study and in Norberg and colleagues' (2007) study, where all relationships between variables had a correlational nature. In this context, two important caveats must be noted before drawing any conclusions. Firstly, despite the fact that the theoretical framework of EA (Hayes et al., 1996) supports the causal relations implied in the mediation models, and despite the fact that testing these models yielded significant results, the causal pathway of the relationships between cognitions and skin picking will remain unclear in absence of experimental evidence. Secondly, although the fact that hypothesis 4 was not supported and so could be regarded as supporting evidence for the causal path proposed in hypotheses 1, 2 and 3 (i.e. maladaptive cognitions – EA – PSP symptom severity), it does not prove such a causal path. What it does, is it rules out one competing causal order (i.e. PSP symptom severity – maladaptive cognitions – EA). This means that other alternative causal sequences remain possible and therefore the findings do not establish with certainty that the causal sequence is as proposed by the three hypotheses. In short, it cannot be concluded based on present findings that the maladaptive cognitions foster experiential avoidance, which in turn leads to more severe skin picking. By

extension, these findings do not guarantee that lowering experiential avoidance will make the condition vanish, or, that experiential avoidance will decrease as a result of decreased symptom severity. In spite of this limitation, this study represents an important step towards designing treatments based on empirically derived models.

Another question that requires further clarification is whether experiential avoidance mediates the relation between dysfunctional beliefs and actual picking. The symptom severity subscale of the SPS-R (Snorrason et al., 2012) measures, apart from time spent picking, the frequency of urges to pick, the intensity of these urges, and the amount of self-control over skin picking. Since the analyses involved a score comprising all these four aspects, it is unclear whether the observed patterns apply to each of these individual items, and therefore no conclusion can be drawn regarding actual picking. The need to clarify this aspect in future studies is emphasized by findings in TTM which showed that, although individuals who were more experientially avoidant reported more frequent and intense urges to pull, and were less able to control their urges to pull than persons who were lower in experiential avoidance, they did not pull more frequently than non-avoidant individuals (Begotka et al., 2004).

With further regard to the SPS-R scale (Snorrason et al., 2012), the present study also has an advantage. Different from previous mediation studies in PSP (Flessner & Woods, 2006) and TTM (Norberg et al., 2007), which employed overall measures of condition severity such as the original Skin Picking Scale (SPS; Keuthen et al., 2001) and the Massachusetts General Hospital Hair-Pulling Scale (MGH-HS; Keuthen et al., 1995) respectively, the use of the SPS-R in this study enabled a distinction between symptom severity and impairment. This distinction is important because the two measures represent different aspects of the condition and might not be correlated (Snorrason et al., 2012). For instance, one could perform the picking for limited periods of time and have severe skin damage (Twohig et al., 2006), or perform the picking for long periods of time but with little psychosocial impairment because they have a support network. The present study took advantage of the two-factor structure of the SPS-R scale and investigated symptom severity, using the corresponding sub-score provided by the SPS-R. For this reason, it offers a finer analysis and allows for clearer, valid conclusions to be made, uniquely regarding symptom severity. These results could be complemented in the future by empirical data on the relationships between maladaptive cognitions and impairment. For example, it would be interesting to see whether this relationship too is mediated by EA, and whether greater impairment predicts higher levels of experiential avoidance, either directly or indirectly via maladaptive cognitions. Such studies would provide further information regarding the potential effects of an intervention targeting EA.

A second limitation is represented by the fact that anxiety and depression levels were not measured, as pointed out by Begotka and colleagues (2004) in their TTM study. Anxiety and depression symptoms have been found to correlate with both EA and PSP symptom severity (Flessner & Woods, 2006), and therefore could have confounded results in the first part of the analysis. The fact that the majority of participants reported an additional psychological diagnosis, and the fact that previous studies found that a significant number of individuals with PSP report symptoms of anxiety and depression (Tucker et al., 2011), further emphasizes the need to measure and control for these potentially confounding variables in future

studies. The high comorbidity indicated by descriptive results also makes it inadequate to conclude that present findings support previously documented similarities between PSP and TTM (Cullen et al., 2001; Lochner et al., 2002; Snorrason et al., 2012; Grant & Stein, 2014), simply because it is unknown how many of the PSP participants also endorsed TTM symptoms. Conversely, it is unknown how many of the TTM participants in Norberg et al.' (2007) study also endorsed PSP symptoms. While this methodological issue is inherited in the co-occurrence of the two conditions, it should be considered that this co-occurrence might cause an inflated view of the similarities between PSP and TTM if future studies do not use more stringent inclusion criteria. For this reason, it would be too early to conclude that TTM and PSP are topographical variants of the same pathology (Twohig et al., 2006; Yeh, Taylor, Thordarson, & Corcoran, 2003). By extension, it is desirable that more research is conducted on PSP samples, which currently lags behind TTM research (Snorrason et al., 2012; Grant & Stein, 2014).

Another aspect that deserves consideration when discussing variables that need to be controlled for is the type of skin picking. Since focused picking is related more to private emotional experiences due to its intentional nature, it has been suggested that experiential avoidance might play a more central role in this type of picking rather than in automatic picking, which occurs outside the person's awareness (Norberg et al., 2007; Begotka et al., 2004; Flessner et al., 2008). In this regard, although present results support the EA model of PSP, they do not establish whether the findings apply specifically to focused PSP or to automatic PSP as well, because subtypes of the condition were neither measured nor controlled for. While answering this question could shed light on the etiology of PSP subtypes and it is desirable that future studies do attempt to address it, one methodological issue is the common coexistence of both focused and automatic picking in one individual, making it difficult to tease apart the two subtypes. This is also the reason why ACT (which tackles experiential avoidance) is typically being used in combination with HRT (which tackles the act of picking itself), rather than alone (Flessner et al., 2008; Capriotti et al., 2015) – to ensure that both focused, and automatic skin picking are addressed.

A third aspect which might pose methodological concerns relates to the sample composition, which was 92% female. Although PSP is 3 times more often reported by females than by males (Odlaug et al., 2013) the sample may still not be representative of men. This aspect should be taken into account by future studies, especially since there is indication that the some phenomenological aspects of the condition are different in males compared to females (Odlaug et al., 2013). Another possible concern regarding the sample is related to the online nature of the study. Firstly, although participants were required to confirm endorsing symptoms of SP in order to be included in the study, the majority of them were self-reported, which makes it questionable whether their picking is pathological, particularly since 63% of non-clinical population engages in some form of picking (Lang, Didden & Machalicek, 2010). However, because the study was more concerned with the severity of skin picking rather than the presence or absence of the condition, this aspect is not necessarily problematic, especially since the sample was found to be in the clinical range in terms of overall severity, as measured by the SPS-R (Snorrason et al., 2012). Moreover, because the severity of PSP symptoms fluctuates over time (Flessner and Woods, 2006) and the SPS-R only targets the past week, many PSP

individuals would have been excluded from the study despite having the condition. Ideally, future studies should conduct diagnostic interviews, which could be helpful especially in eliminating alternative causes of the picking behaviour and distinguish between participants that suffer from PSP and those who do not (e.g. have a dermatological condition). In practice, this would be difficult and expensive because individuals with SP represent a relatively rare population and often choose not to reveal their condition, and because correlational research requires large samples (Begotka et al., 2004).

Another typical concern with online surveys is the fact that some participants provide false data. Since participation in this study did not imply any direct benefit such as payment or course credits and the internal consistency was high in all five scales, it is highly unlikely that such limitation is applicable. For these reasons, it could be argued that the online nature of the survey constitutes one of the strengths of this study, as it allowed an efficient collection of valuable data from a relatively large sample, on three cognitive measures (i.e. BFNE, BAAS and OASS) never measured previously in PSP. However, it could be recommended that present findings are not generalized to clinically ascertained samples but rather regarded as preliminary data informing hypotheses to be tested in referred samples (Norberg et al., 2007).

Another strong aspect of the present study over previous studies investigating the mediating role of EA in PSP (Flessner and Woods, 2006) or TTM (Norberg et al., 2007) is the use of an updated version of the AAQ, namely AAQ-II, which has been found to have better psychometric properties and factorial structure (Bond et al., 2011), thus increasing the sensitivity of the analysis. Nonetheless, because the AAQ-II constitutes a general measure of experiential avoidance, the next step would be to employ a PSP-specific version of the questionnaire, as suggested by Begotka and colleagues (2004) in relation to TTM. Such a tool has not been developed yet but future research could benefit from adapting the AAQ-II to skin picking pathology, as it would allow the measurement of an EA related to aspects characteristics of this condition, which might differ from the EA measured in other domains. This assumption is supported by other disorder-specific modifications to the AAQ-II which have been shown to be more precise than the original version of the questionnaire in measuring EA in specific cases involving for example cigarette smoking (Gifford et al., 2004), chronic pain (McCraken, Vowles, & Eccleston, 2004), auditory hallucinations (Shawyer et al., 2007), epilepsy (Lundgren, Dahl, & Hayes, 2008), social anxiety (MacKenzie & Kocovski, 2010) or substance abuse (Luoma, Drake, Hayes, & Kohlenberg, 2011). Further support for the development and use of a PSP-specific measure of experiential avoidance comes from a recent study which showed that a Trichotillomania-specific version of the AAQ-II (AAQ-TTM) has stronger correlations with measures of TTM pathology, while the AAQ-II is more strongly correlated with general psychopathology (Houghton et al., 2014).

Like Norberg and colleagues' (2007) noted about their study, the present study might appear narrow in scope with regard to the internal events it investigated, having included only three measures (i.e. BFNE, BAAS and OASS), the study was not concerned with these specific categories but rather with the idea that EA mediates the relation between unpleasant internal events in general and the severity of PSP symptoms. In this sense, it constitutes an important step in this area of investigation, being the first study to examine this relation. Future studies should examine other

cognitive constructs potentially related to skin picking and determine whether these relationships are also mediated by experiential avoidance. Furthermore, aversive sensations could be investigated in studies similar to the current one. According to the EA model, unpleasant sensations should be related too to PSP symptom severity and this relation should be mediated by EA levels. Unpleasant sensations are particularly important to study since individuals with PSP are characterized by high levels of perfectionism and a desire to improve physical appearance (Koblenzer, 1983; Stein, Hutt, Spitz, & Hollander, 1993). Indeed, PSP has been conceptualized in the literature as a repeated attempt to remove or minimize non-existent or slight imperfections (Grant, Menard, & Phillips, 2006) and picking can be triggered by the sight or feel of stimuli such as pimples, insect bites, scabs and others alike (Bohne et al., 2002). However, the potential relationships between aversive sensations, EA and PSP have not been addressed in a mediation study yet. Apart from conducting such analysis on unpleasant sensations, future studies should also aim to integrate these results with findings on cognitions (presented here) and with previous findings on emotions (e.g. Flessner & Woods, 2006). The aim would be to build models that help explain the complex relationships between these constructs. The possibility of other PSP-relevant mediating mechanisms, besides EA, should also be entertained and investigated in future studies, especially since interventions tackling experiential avoidance do not appear to provide complete recovery, suggesting that EA might be only part of the answer (Twohig et al., 2006; Flessner et al., 2008; Capriotti, et al., 2015).

Last but not least, the present study is important in having revealed the fact that the majority of participants had not been diagnosed by a professional. This has not been captured by previous studies which either did not ask participants at all about who diagnosed them with PSP (Bohne et al., 2002; Odlaug et al., 2013, Flessner & Woods, 2006) or only allowed the option “other”, rather than the explicit answer “I am self-reported” (Tucker et al., 2011). The high number of self-reported PSP individuals is in line with the view that the prevalence of PSP may be underestimated, as individuals tend to avoid seeking help (Neziroglu et al., 2008). One explanation for this finding could be the high levels of shame and fear of negative evaluation found in individuals with PSP, which combined with stigma associated with the condition (Woods, Friman, & Teng, 2001), could make it difficult to disclose the problem. Another reason could be the general view among individuals with PSP that interventions have poor outcomes and that most treatment professionals are not particularly knowledgeable about PSP (Tucker et al., 2011), which could make them see little (if any) advantage in reporting the problem to a practitioner. Alternatively, it could be an artefact of the present sample. Specifically, it could be that individuals who are part of support groups online are less inclined to seek professional help for their skin picking. While still descriptive, these preliminary findings warrant further investigation into the prevalence rates of this category and the reasons behind it.

In addition to the contributions mentioned so far, this study is important for emphasizing the need of advancing research in PSP towards more challenging aspects. Over the past decade, an increasing number of studies have examined the prevalence and phenomenology of this condition (Odlaug et al., 2013). Undoubtedly, such studies have played an important role in understanding the fact that skin picking can take pathological forms and have outlined the fact that PSP deserves the amount of attention that TTM have been receiving from the scientific community. The

next important step to be made in PSP research would be to address questions regarding etiological and maintaining mechanisms in this condition, with the ultimate aim of translating the acquired knowledge into practice and provide effective interventions for individuals with PSP. The present study constitutes such an attempt.

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