Substance Use and Shame: A Systematic and Meta-analytic Review

Jason B. Luoma

Christina Chwyl

Portland Psychotherapy Clinic, Research, and Training Center

Josh Kaplan

Pacific University School of Graduate Psychology

CITATION

Author Note

Address correspondence to: Jason Luoma, Ph.D., Portland Psychotherapy, 3700 N Williams,

Portland, OR 97227, USA. Phone: +1503-281-4852. Contact:

jbluoma@portlandpsychotherapyclinic.com

Abstract

Shame has been hypothesized to both contribute to and protect against problematic substance use, yet no systematic reviews of these relationships exist. We identified 42 studies of the empirical associations between shame and substance use or substance use-related problems in order to elucidate this relationship. A meta-analysis of 14 samples found no significant association between shame and substance use ($r = .00$). A meta-analysis of 18 samples found a significant association between shame and substance use-related problems ($r = .16$), an effect size similar to that found in previous meta-analyses of the association between depression and substance use. Samples in treatment for substance use disorders had higher experienced shame than controls. Over longer periods of time (i.e., months to years) shame was not a reliable predictor of substance use. Over shorter periods of time (i.e., hours to days), shame predicted more substance use, though this was qualified by complex interaction effects with shame sometimes appearing to have protective functions. Two studies demonstrated that substance use in particular contexts results in shame. The discussion identifies potential moderators of the relationship between shame and substance use and recommendations future research directions.

Keywords: substance use, shame, meta-analysis, systematic review, substance use disorder

Substance Use and Shame: A Systematic and Meta-analytic Review

Introduction

Substance use disorders (SUDs[1]) are among the most commonly occurring disorders in America (Merikangas et al., 2010). Of all psychiatric disorders, SUDs are second only to depressive disorders in terms of their contribution to global disability prevalence (Whiteford, Ferrari, Degenhardt, Feigin, & Vos, 2015). Thus, identifying risk factors for the development of SUDs and variables that maintain substance use is of high importance. Both negative reinforcement (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004) and tension-reduction (Cooper, Frone, Russell, & Mudar, 1995) models share the idea that negative affective states cue substance use, which in turn serve to escape or avoid that affective state.

One particular negative affective state, shame, has been theorized to serve a central role in the development and maintenance of SUDs. Both clinical models (Cook, 1991; Potter-Efron, 2002; Luoma, Hayes, Wiechelt, 2007) and research (e.g., Dearing, Stuewig, & Tangney, 2005; Luoma, Guinther, DesJardins, & Vilardaga, 2018) have attempted to explain how shame contributes to SUDs. Yet the relationship between shame and SUDs is unclear, with some studies finding a significant positive association between shame and substance use (e.g. Stuewig et al., 2015), others finding a significant negative association between these variables (e.g., Grynberg et al., 2017), and some finding null associations (e.g. Dodge & Clarke, 2018). A systematic review of the empirical associations between shame and substance use, as well as shame and substance use-related problems, can help clarify whether, and in what contexts, shame is related to these outcomes. Thus, a comprehensive review of data linking shame to substance use, as well as substance use-related problems, is warranted.

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[1] SUD = substance use disorders

Two Competing Views of the Functions of Shame

Although a uniform and non-controversial view of the functions of shame does not exist, existing literature does describe two ways of understanding its role in regulating behavior. The first, older and more common literature views shame as an overwhelmingly maladaptive emotion that rarely has adaptive functions. A second, more recent literature views shame as being either maladaptive or adaptive, depending upon the context in which it is experienced. Below, we briefly review these two literatures as they relate to substance use.

Shame as maladaptive. According to this perspective, shame involves a negative evaluation of one's self and is often contrasted with guilt, which involves a negative evaluation of one's behavior (Dearing et al., 2005; Gilbert, 1998; Lewis, 1971). Thus, shame tends to motivate social withdrawal and avoidance in an attempt to protect the fragile, bad self. In contrast, guilt tends to motivate people to take adaptive actions to repair perceived harms (Tangney, Stuewig, & Mashek, 2007). This view emerges largely from an individual differences perspective using global self-report measures of shame proneness. Research in this domain shows that a tendency to experience shame across a variety of contexts (i.e. shame proneness) is reliably associated with many negative outcomes across a variety of domains of functioning (Tangney et al., 2007).

In the context of substance use, the maladaptive functions of shame have been most often articulated in cyclical models wherein substance use allows escape from and avoidance of painful feelings of shame, but also leads to behaviors that trigger shame (Dearing et al., 2005; Weichelt, 2007; Luoma et al., 2018). According to these models, shame could drive the initial development of problematic substance use as a form of avoidance. Growing tolerance would then result in higher

levels of consumption that then could lead to shame through various means. For example, failing

to pick up one's child from school, losing a job, drinking more than is deemed suitable in one's

culture, or getting into an argument with one's spouse as a result of substance use could all be

seen as violations of social norms or moral guidelines that could result in shame. The resulting

shame could serve as an antecedent for more substance use, thus perpetuating the cycle. Shame

could also serve to maintain substance use among those less prone to shame initially who might

first use substances because of other reasons (e.g., Koob & Le Moal, 1997). However, as

substance use begins to result in moral failures, norm violations, or personal failures, shame may

contribute to negative affective that further fuels use.

Functional views of shame. A functional evolutionary view of shame is based upon the

idea that emotions evolved because they serve adaptive functions (Cibich et al., 2016; Keltner,

1995; Keltner, 1997). Accordingly, shame evolved to alert individuals to threats to social

belongingness, and occurs in response to situations involving failures of competency, or failures

to conform to moral guidelines and social norms (Leach & Cidam, 2015). From this perspective,

the distinction between shame and guilt is often not as clear as in the previous literature. While

acknowledging that shame is often maladaptive, functional evolutionary views can also account

for findings showing that shame sometimes motivates constructive approaches to failure in an

attempt to repair a positive self-image. For example, shame may motivate cooperative behavior

(Declerck, Boone, & Kiyonari, 2014), self-improvement (Lickel, Kushlev, Savalei, Matta, &

Schmader, 2014), or prosocial behavior (de Hooge et al., 2008). This literature features

experimental or laboratory studies of shame in which contextual variables, that affect whether

shame has adaptive or maladaptive functions, are manipulated (e.g. de Hooge et al., 2008;

Declerck et al., 2014). This literature generally does not consider individual differences in

response to shame and tends to study shame experienced at a more mild-to-moderate level. A recent meta-analysis of laboratory studies of shame showed that the largest moderator of the relationship between shame and positive approach to failure was whether one's failure or social image is perceived as more or less repairable (Leach & Chidam, 2015). Essentially, this literature indicates that if people see a way to repair a more positive sense of self, they will engage in those actions. However, if this option does not appear available, people will revert to patterns of behavior aimed at escaping or avoiding the painful emotion of shame.

Authors have proposed several ways in which shame may serve to mitigate or prevent substance use. For example, some have proposed that shame may be part of a stigmatization process that motivates some people to avoid substance use in the first place or stop substance use once initiated (Satel, 2007). Others have turned to research on interpersonal facilitative functions of shame, wherein expressions of shame are thought to facilitate relational repair in the aftermath of deviations from moral guidelines or social norms (Cibich, Woodyatt, & Wenzel, 2016; Keltner, 1995). Indeed, research has shown that contextually appropriate nonverbal expressions of shame elicit sympathy and cooperation from others (Keltner et al., 1997). Thus, for people who have engaged in behavior that has violated important moral guidelines or social norms as a result of their substance use, the expression of shame might help repair strained social roles that are often damaged when substance use becomes more severe (Luoma et al., 2012). Other data have shown that shame predicts self-change motivation (Lickel et al., 2014), raising the possibility that shame may sometimes contribute to motivation for reducing substance use under certain conditions.

Objectives of the Current Review

As research on shame in relation to substance use appears to be accelerating (see Appendix A) and theories on the relationship between shame and substance use conflict, a comprehensive review would be helpful to inform future research. In addition, no comprehensive systematic review of the relationship between shame and substance use exists, to our knowledge. The only other review of empirical findings on the relationship between shame and substance use we found (Rahim & Patton, 2015) reviewed data through January, 2012 and included only six articles (four qualitative, two quantitative) related to shame and substance use in youth. The authors concluded that these papers indicated an association between shame and both psychopathology and substance use. The purpose of the current paper is to conduct an evaluative systematic review of all published empirical associations between shame and substance use or substance use-related problems. The review also includes a meta-analysis of all published cross-sectional correlational data of the association between shame and substance use and substance-used related problems. Based on the idea that the negative consequences associated with problematic patterns of substance use will also tend to evoke shame, previous authors have suggested that shame may be more closely related to negative consequences resulting from substance use than level of substance use, per se (Luoma, Guinther, Potter, & Cheslock, 2017). Thus, these two associations are analyzed separately in the meta-analyses.

Measurement Issues

The literature reviewed above highlights the need to examine how shame is defined and measured in its association with substance use. Particularly, cyclical models suggest the need to distinguish between two aspects of shame: 1. a general, trait-like proneness toward shame that might contribute to the initial development of problematic substance use, and 2. current experiences of shame that may directly trigger or maintain substance use. Existing self-report

measures can be roughly categorized into two groups, which, in this review, we refer to as *shame proneness* and *experienced shame*. Measures of shame proneness typically present respondents with a range of scenarios that might elicit shame and ask them to indicate their likely response, some of which are characteristic of shame. These measures capture a global predisposition toward or proneness toward shame, the most common of which is the Test of Self Conscious Affect (TOSCA; Tangney, Dearing, Wagner, & Gramzow, 2000). In contrast, measures of experienced shame ask people to self-identify shame, or present them with various thoughts, feelings, action tendencies, or behaviors associated with shame and ask them to indicate how often they have these experiences. Measures of experienced shame may assess shame in a trait-like manner or, alternatively, they may measure shame in more specific contexts, such as in the present moment, over the last day, or in relation to a particular content area, such as one's body or substance use. The most common measure of experienced shame in this review is the Internalized Shame Scale (ISS; Cook, 1988).

Method

Article Retrieval and Literature Review

The method for this review was based on an adapted version of the PRISMA guidelines for systematic reviews (Liberati et al., 2009). Inclusion criteria were: a) original research published in a peer-reviewed journal, b) quantitative study, and c) assesses shame in relation to substance consumption or substance use-related problems. Exclusion criteria were: a) dissertations, b) qualitative or case studies, c) not reported in English, d) substance use related to self not measured (e.g. study only measured substance use of parents of participants).

PubMed, PsycInfo and Web of Science were searched using the term *shame* in pairwise combination with *substances*, *drink*, *drug*, *drugs*, *alcohol*, *illicit*, *smoke*, *smoking*, and *nicotine*.

We identified 1427 records after 763 duplicates were removed, with the last search on March 2nd, 2018 (see supplementary materials for more detailed information). The process of arriving at the final set of papers is outlined in the PRISMA diagram (see Appendix B). The screening process began with one author excluding 766 records with clearly irrelevant titles. Two authors independently reviewed remaining article abstracts and excluded articles if both authors agreed upon exclusion ($n = 316$). For the remainder of the 345 articles, two authors independently reviewed the full text with disagreements resolved by a third rater. Eligibility criteria were not met by 303 articles, leaving a final set of 42 papers, that included 54 samples, for the review.

One author extracted the following data from each paper: sample size, participant information, study type, substance type, shame measure(s), substance use measure(s), results and analyses, article limitations, a subjective quality rating from 1 (low quality) to 5 (high quality), and key results. A second author checked the extracted data with disagreements resolved by discussion. If information relevant to the review was missing, we contacted authors for additional information.

Meta-Analyses

Inclusion Criteria. We conducted two separate meta-analyses to quantify the magnitude of correlation between: 1) shame and measures of substance consumption and 2) shame and measures of substance use-related problems or dependence (hereafter referred to as substance use-related problems for simplicity). Only studies that reported correlations between shame and substance use retrospectively, and at the same time point, were included in the meta-analyses. Measures of specific types of shame (e.g., body shame or HIV shame), as opposed to global shame were excluded from analyses because including these studies would likely create undesirable variability in measurement methods. Combining studies that are disparate in their

measurement methods is a frequently cited issue in meta-analytic reviews (e.g. Card, 2015; Field & Gillet, 2010; Petticrew & Roberts, 2006), and can result in estimates that do not reflect the means of any groups. This is particularly true if moderator analyses are not possible, and given our small sample size, we were only able to conduct limited moderation analyses.

Computation and Analysis of Effect Sizes. For studies that contained several Pearson correlations (rs), we first transformed r into Z_{Fisher} (Fisher, 1921) and then calculated the average effect size across all measures of either substance use or substance use-related problems, depending upon the meta-analysis being conducted (Rosenthal, 1991). This method ensured that each study would contribute only one effect size capturing the association between shame and substance consumption and/or one effect size capturing the association between shame and substance use-related problems. For papers which assessed different types of substances (e.g. alcohol and marijuana use), we averaged these associations across substance type. Additional information about the association between substance type and shame can be found in the Supplementary Materials. For papers with multiple samples, we calculated separate average effect sizes for each sample. For studies that reported both TOSCA shame and TOSCA shame after guilt was partialled out (Dearing et al., 2005; Hequembourg & Dearing, 2013; Stuewig, Tangney, Mashek, Forkner, & Dearing, 2009; Tangney, Stuewig, Mashek, & Hastings, 2011; Treeby & Bruno, 2012; Treeby, Rice, Cocker, Peacock, & Bruno, 2018), we only included the latter in the averaged effect sizes as previous research has suggested that partialled TOSCA scores are the more valid measure of shame proneness (e.g. Tangney & Dearing, 2002). The Supplementary Materials have more detail on analyses involving: 1. the TOSCA, including comparisons of unpartialled and partialled TOSCA values. To facilitate interpretation, we transformed Z_{Fisher} back to r after completing statistical operations.

Mean effect sizes across studies were characterized using a weighted average of each

Z_{Fisher} and 95% confidence intervals (Hedges & Vevea, 1998). We selected a random-effects

model based upon the assumption that our data would have variable population parameters and

average effect sizes (Hunter & Schmidt, 2004), and in order to preserve our ability to generalize

findings to studies outside of the current meta-analyses (Hedges & Vevea, 1998; Field & Gillett,

2010). Meta-analyses were conducted using SPSS 20 using Field and Gillett's (2010) syntax.

Moderator Analyses. We tested three continuous moderating variables: gender

(operationalized as the percentage of participants who reported a gender other than man),

ethnicity (operationalized as the percentage of White participants) and mean age; and four

categorical variables: type of shame measure (i.e. proneness vs. experienced; Luoma et al., 2017)

and sample types (i.e. SUD vs. no SUD, college students vs. other, incarcerated vs. not

incarcerated) with random effects weighted multiple regression models (Field & Gillett, 2010).

Results

Our review begins with meta-analyses assessing the magnitude of relationship between

shame and substance consumption and between shame and substance use-related problems.

Next, we provide a qualitative review of studies focused on the hypothesized temporal relations

between shame and substance use, that is, whether shame precedes substance use, follows

substance use, or both. Finally, we offer a synthesis of the findings from studies measuring more

specific types of shame.

Meta-Analyses

Meta-Analysis of Association Between Shame and Substance Consumption. Overall,

14 effect sizes were calculated for the association between shame and substance consumption. A

forest plot of study effect sizes and 95% confidence intervals are displayed in Figure 1. A total of

3805 people participated in the studies used in the present analyses (M_{age} = 29.96, SD_{age} = 8.04).

Participants' race was reported in 13 studies and gender in all 14 studies; in these studies,

62.61% of participants were White and 47.12% identified as either a woman or gender minority.

The mean weighted effect size for the association between shame and substance

consumption across the 14 studies was r = .00 (95% CI = [-.05, .06]), which was not

significantly different than zero (z = .13, p = .893). We measured heterogeneity of effect sizes

with the Q_w statistic, which tests whether the distribution of effect sizes around the mean is

significantly greater than what would be expected from sampling error. A nonsignificant Q test

allowed us to reject the hypothesis that significant heterogeneity exists between the sample

estimates, Q_w (13) = 15.51, p = .277. The I^2 value, which describes the percentage of variation

across studies that is due to heterogeneity rather than chance, was 16.2%, suggesting a low level

of heterogeneity. The funnel plot (Light & Pillemer, 1984; see Appendix C) suggested minimal

publication bias in favor of publishing only significant findings; this was reflected in higher

variability in effect sizes at smaller sample sizes and effect sizes approximately equally

distributed across the range of values.

Of the moderators we assessed, only shame type (proneness vs. experienced measure)

was a trending moderator of the association between shame and substance consumption, χ^2 (1, k

= 12) = 3.06, p = .080. Because our random effects models cannot include studies in which both

experienced shame and shame proneness were assessed in the same study (i.e., Grynberg et al.,

2017; Luoma et al., 2017), we ran two additional models that included either the two shame

proneness measures or the two experienced shame measures. These models slightly increased the

strength of the effect, with parameters of χ^2 (1, k = 14) = 3.69, p = .055 and χ^2 (1, k = 14) = 3.84,

p = .050, respectively. The mean association across k = 9 studies that only measured shame

proneness was not significantly different than zero ($r = -.05$, 95% CI = [-.12, .02]; $z = 1.30$, $p =$ .195). Heterogeneity was nonsignificant, $Q_w(8) = 10.96$, $p = .204$ and low ($I^2 = 27.0\%$). The mean association across the $k = 7$ studies that only measured experienced shame was not significantly greater than zero ($r = .08$, 95% CI = [-.01, .17]; $z = 1.69$, $p = .091$). Heterogeneity was nonsignificant, $Q_w(6) = 5.50$, $p = .481$ and very low ($I^2 = 9.1\%$).

Meta-Analysis of Association Between Shame and Substance Use-Related Problems. Overall, 18 effect sizes were calculated for the association between shame and substance use-related problems. Forest plots of individual study effect sizes and 95% confidence intervals are displayed in Figure 2. A total of 5,250 people participated in the studies used in the present analyses ($M_{age} = 28.29$, $SD_{age} = 7.47$). Participant race and gender were reported in 17 studies; in these studies, 67.88% of participants were White and 51.59% identified as either a woman or gender minority.

For the association between shame and substance use-related problems, the mean weighted effect size across the 18 studies that was $r = .16$ (95% CI = [.13, .19]), which was significantly different than zero ($z = 9.60$, $p < .001$). Heterogeneity for the association between shame and substance use-related problems was nonsignificant, $Q_w(17) = 18.27$, $p = .372$. The I^2 value was 7.0%, suggesting a very low level of heterogeneity. We used Rosenthal's (1991) failsafe N to assess the number of additional studies that would be needed to bring statistically significant associations down to the p = .05 level. The failsafe N for the association between shame and substance use-related problems was 821. This relatively high number indicates that the association between shame and substance use-related problems is stable and tolerant to null results. The funnel plot (see Appendix D) suggested minimal publication bias in favor of

publishing only significant findings; this was reflected in variable effect sizes at small sample sizes and a tall peak converging near the mean effect size computed.

        Of the moderators we assessed, only gender (operationalized as the percentage of participants who identified as either a woman or gender minority) moderated the association between shame and substance use-related problems. As the percent of the sample that identified as either a woman or gender minority increased, the association between shame and substance-related problems became stronger, ($\beta = .001$, 95% CI = [.00, .00], $SE = .00$; $t(14) = 2.21$, $p = .044$). The mean association between shame and substance use-related problems across the $k = 7$ samples with predominantly men was lower ($r = .12$; 95% CI = [.08, 16]; $z = 5.35$, $p < .001$; failsafe $n = 61$) than the mean association between shame and substance use-related problems across the $k = 10$ samples with predominantly participants who identified as either a woman or gender minority ($r = .20$; 95% CI = [.15, .24]; $z = 9.05$, $p < .001$; failsafe $n = 334$). The test of heterogeneity was nonsignificant for both samples, $Q_w(6) = 6.01$, $p = .422$, $I^2 = 1.7\%$, and $Q_w(9) = 9.11$, $p = .427$, $I^2 = 1.2\%$, respectively. Mean sample age, percentage of White participants, type of shame measure and sample type did not significantly moderate results ($ps > .220$).

Qualitative Synthesis

        We next summarize the remainder of the studies. First, we discuss between group studies comparing non-SUD to treatment-seeking SUD samples since this further informs whether shame is associated with more problematic patterns of use. We then review studies that investigate temporal relationships between shame and substance use of the sort theorized in cyclical models of shame and substance use. Finally, we examine the relationship between substance use and specific, as opposed to global, types of shame.

Between Group Studies Comparing SUD to Control Samples. Five studies examined whether SUD samples report higher levels of shame than non-SUD samples. Two studies found that samples of people in treatment for SUD reported higher levels of experienced shame compared to established norms based on college students (Meehan et al., 1996; O'Connor et al., 1994). In another study, the authors coded shame from interviews in which participants discussed their lives. The authors found that the sample of people in SUD treatment had higher level of coded shame than a sample of unemployed people and a sample of college students (Viney, Westbrook, & Preston, 1985). A 14-day ecological momentary assessment study compared people in treatment who had both SUDs and a history of childhood abuse and/or neglect to two community samples screened for the absence of Axis I disorders, one of which also had experienced childhood abuse and neglect (Holl et al., 2017). The SUD sample reported experiencing more shame across the 14 days than the two control samples. A fifth cross-sectional study compared 25 inpatients diagnosed with severe alcohol use disorder who were screened negative for any concurrent disorders to 25 healthy controls who were screened negative for any history of SUD or psychiatric disorders. Participants with alcohol dependence did not significantly differ from controls in their levels of shame proneness and did not differ in experienced shame after controlling for depression (Grynberg, de Timary, Van Heuverswijn, & Maurage, 2017). However, using the published groups means and standard deviations, we conducted a t-test that showed a trend toward experienced shame being higher in the alcohol dependent group, $t(49) = 1.89$, $p = .07$.

Shame predicting subsequent substance use over an extended period. In this section, we review three prospective studies that found higher shame predicted higher subsequent substance use and three studies that found higher shame predicted lower subsequent use. The aim

of this section is to understand whether shame is a risk or protective factor for changes in

substance use, including the development of problematic patterns of substance use, over more

extended periods of time.

The first study found that shame predicted higher subsequent substance use (Stuewig et

al., 2015). Shame proneness, assessed in 5th grade, predicted the development of risky

behaviors, assessed when participants were between the ages of 18 and 21 ($N = 258$). Childhood

shame proneness significantly predicted drinking at an earlier age, using a greater variety of

drugs, ever using heroin, using other drugs, using a greater number of illegal drugs, and driving

under the influence. Shame proneness also trended toward predicting ever: drinking alcohol,

using stimulants and using hallucinogens. These analyses remained significant when controlling

for socioeconomic status and 5th grade teacher ratings of student aggression, with the exception

of driving under the influence which became a statistical trend. Shame proneness did not

significantly predict cigarette use, number of alcoholic drinks, ever using marijuana, ever using

depressants, or ever using inhalants.

The second study (Randles & Tracy, 2013) was one of only two studies in this review

measuring shame via a means other than self-report. In this study,105 newly sober people

(average sobriety = 2.5 months), recruited from alcoholics anonymous, completed a baseline

assessment and follow-up four months later. At baseline, participants' nonverbal shame

behaviors (chest narrowed and shoulders slumped) were coded from the first 10 seconds of a

video-recorded interview of them describing the last time they drank and felt badly about it.

Nonverbal shame displays, but not self-reported state shame, significantly predicted an increased

likelihood of relapsing over the next four months. Nonverbal shame was a significant predictor,

even after controlling for demographic variables, alcohol dependence, affect, shame proneness,

and self-esteem. For people who relapsed, nonverbal shame also predicted the quantity of alcohol subsequently consumed.

A third study (Boudrez, 2009) of 124 people enrolled in a smoking cessation program found that higher levels of experienced shame (assessed via a personality inventory at pre-treatment) predicted fewer smoke-free days after treatment and more relapse 8 years later.

The first study (Dearing, Witkiewitz, Connors, & Walitzer, 2013) associating shame with lower drinking over time was a prospective study of factors that may influence the course of drinking among 206 people with hazardous levels of drinking that had not been in treatment in the year prior to the start of the study. Assessments were conducted every six months for two years, for a total of five assessments. Shame proneness at baseline predicted a lower percentage of heavy drinking days at every assessment point, including baseline (reported above).

A second study (Luoma, Kohlenberg, Hayes, & Fletcher, 2012) associating shame with lower substance use included analyses of change processes during a randomized trial involving an intervention based on acceptance and commitment therapy (ACT) that targeted shame among people in treatment for SUD. In this study, 134 clients at a residential SUD treatment center were randomized to either six hours of ACT plus treatment as usual (ACT+TAU) or to TAU. At the 4-month follow-up, participants reported their drug or alcohol over the previous 13-weeks and were scored as being or not being alcohol and drug free each week. Neither those in the ACT arm of the trial nor those in the TAU arm demonstrated a correlation between shame at post-treatment and substance use at follow-up. However, greater decreases in shame from pre- to post-treatment predicted a significantly higher number of weeks in which participants reported using a substance at follow-up in both the TAU arm, $r(31) = -.41$, $p = .02$, and ACT arm, $r(31) =$

-.36, $p = .04$, indicating that rapid reductions in shame early in treatment predicted poorer

treatment response.

 The third study (Tangney et al., 2016) examined factors that predicted changes in pre-to-

post incarceration substance use among 305 inmates. Most inmates decreased their substance use

over the duration of the study. Shame proneness was unrelated to changes in most substance use

variables (such as alcohol frequency and dependence, hard drug frequency and dependence and

marijuana dependence). However, higher shame proneness during incarceration predicted a

greater decrease in the frequency of marijuana use after incarceration (Tangney et al., 2016).

 Shame and substance use over a brief time period. In this section, we summarize

studies that examined whether shame is associated with substance use over a shorter temporal

window, such as hours or days, as these studies are most relevant to whether shame is a direct

antecedent of substance use or is involved in maintaining problematic patterns of substance use.

Four studies examined whether shame is associated with substance use within short time periods.

Two daily diary studies assessed whether shame assessed during the day predicted drinking that

evening. A third study using ecological momentary assessment examined whether shame was

associated with reports of using drugs or alcohol to manage the emotion at that same point in

time. A prospective study examined whether shame following a drinking event predicted alcohol

consumption over the subsequent week.

 The first study (Mohr, Brannan, Mohr, Armeli, & Tennen, 2008) asked 118

undergraduate drinkers to complete daily surveys of their daytime mood and evening alcohol

consumption for 21 days. Daily variability in ashamed mood (assessed via a single item)

predicted subsequent drinking at home that evening, but not away from home. Overall, positive

moods buffered the relationship between shame and drinking. On days where participants had

higher levels of positive mood, the association between ashamed mood and drinking at home was no longer significant. On a between-subjects level, feeling ashamed (averaged across the 21 days) correlated with drinking at home ($r = .21$, $p < .05$) but not away from home ($r = .12$, $p > .05$).

Another daily diary study (Luoma, Guinther, Lawless DesJardins, & Vilardaga, 2018) of 70 light-to-heavy community drinkers examined the association between day-to-day fluctuations in ashamed mood and evening drinking over the course of 21 days. Between-subject analyses showed that levels of shame during the day predicted solitary drinking that evening, but not social drinking. Analyses of daily variation in ashamed mood showed that higher daily ashamed mood predicted increased quantity of alcohol consumed that evening, but this finding was strongly qualified by a cross-level interaction. For those individuals who experienced above average levels of shame (i.e. high shame individuals), on days where shame was higher than average for that person, they were less likely to drink, but drank more alcohol when they did drink. On days when shame was lower than average for that person, high shame individuals were less likely to drink, but drank less than typical if they did drink. For low shame individuals, on days where shame was higher than average for that person, they were more likely to start drinking alone, but tended to consume less alcohol than typical on these days. Conversely, on low shame days, low shame individuals were less likely to begin consuming alcohol in a solitary context but tended to consume more alcohol alone once they began drinking. Findings persisted even after controlling for daily variability in overall negative affect, suggesting the findings may be specific to shame.

An ecological momentary assessment study (Holl et al., 2017) explored the relationship between shame and substance use over 14 days among 55 people in treatment for SUD with a

history childhood abuse/neglect ($N = 55$) and a community sample of people screened for the

absence of any Axis I disorder, either with ($N = 53$) and without ($N = 43$) a history childhood

abuse/neglect. For all groups, higher levels of shame over the two hours previous to receiving an

automated assessment call were associated with reported use of substances to manage that

emotion during that period. Moderation analyses showed that trauma/SUD participants

responded to shame with higher levels of substance use than the other two groups. While

substance use went up some from low to high shame in the trauma/SUD group, the association

between shame and substance use went up much faster as shame increased in the trauma

community sample. Thus, the trauma/SUD group appeared to use substances to cope with shame

regardless of the intensities of shame experienced, whereas the non-SUD groups tended to use

substances only a high level in reaction to more intense experiences of shame.

Study four from Giguere et al. (2014) had 152 college students first complete a baseline

assessment, and then complete a survey the next time they drank alcohol. Participants also

reported their drinking over the subsequent seven days. Shame following the initial drinking

event predicted a marginally significant increase in alcohol consumption over the next seven

days.

Shame as a Consequence of Substance Use. This section focuses on studies that may

inform when shame is a consequence of substance use. Three studies examined whether

substance use, measured at a single time point, predicted shame at a later time point. All studies

assessed alcohol use, two with college student samples and one with a community sample.

In a daily diary study of 70 community drinkers, Luoma et al. (2018; discussed above)

found that the previous night's total or solitary drinking did not predict shame the next day.

However, they did find a trend toward a cross level interaction relating the previous night's

social drinking to shame the next day. Specifically, people who tended to drink more in social contexts felt more shame when they drank more than usual, whereas people who tended to drink less in social contexts felt *less* shame when they drank more than usual.

Giguere et al. (2014) conducted four studies to examine the links between shame, group identification, norm transgressions and alcohol use in undergraduate drinkers. In the first three studies, participants were randomly assigned to recall a time in which they drank more, about the same, or less than their university peers. Across all three studies, the authors found that participants who were weakly, as opposed to strongly, identified with peers reported more shame related to times when they drank more than they perceived was normal for their peers (i.e., a norm transgression), even when controlling for feelings of guilt. State shame was relatively low when participants reported a time when they drank similarly to or less than their peers. In Study 4, already partially reviewed above, participants reported the next time they drank alcohol after a baseline assessment. For those participants who had weaker group identification with their peers, drinking more than their peers at this event was associated with more subsequent shame, whereas normative or lower levels of drinking did not predict increased shame.

One additional study had nonsignificant results. In this study, 371 college students reported their levels of heavy drinking over the previous thirty days and then, a month later, rated two items assessing how much guilt and shame they were experiencing. These two items were summed into a combined shame/guilt scale. Heavy drinking assessed at Time 1 did not predict shame/guilt a month later (Dodge & Clarke, 2018).

Specific Types of Shame and Substance Use. All of the studies reviewed above assess shame as a global phenomenon, without asking participants whether it could be attributed to a particular cause. This section reviews the handful of studies that examine the relationship

between shame attributed to particular aspects of ones' identity or in response to specific situations and substance use.

Four studies examined the association between body shame and substance use. A cross-sectional study of a diverse sample of 1547 women presenting at family planning clinics found that body shame was associated with more binge drinking over the past month after controlling for demographic variables. In addition, body shame interacted with body surveillance (regularly monitoring the appearance of one's body); higher levels of body surveillance slightly diminished the effect of shame on binge drinking. Body shame did not predict drinking frequency, nor sex after drinking (Littleton, Breitkopf, & Berenson, 2005). A study of 289 undergraduate women found that body shame was associated with self-reported problems with alcohol, but not frequency of smoking or problems related to drug use (Carr & Szymanski, 2010). A study of motivations for cigarette smoking in 146 undergraduate women found that, compared to people who never smoked or who had quit smoking, current smokers reported greater body shame, and body shame significantly predicted smoking cigarettes in order to control appetite and weight (Fiissel & Lafreniere, 2006). A longitudinal study of 141 undergraduate women found that trait body shame measured at baseline was not related to number of cigarettes smoked per day at baseline or three months later (Lamont, 2015).

Four studies assessed the relationship between shame (in reaction to other aspects of identity) and substance use. One study included 716 customers of pharmacies registered to sell non-prescription syringes in heavy, drug-active neighborhoods. In this study, baseline HIV-related shame was related to lower likelihood of being a person who uses injected drugs (Rivera et al., 2015). A study of 369 women who had recently been victimized by a partner found that shame related to aggression toward their partner was unrelated to drug and alcohol use problems

(Weiss, Duke, Overstree, Swan, & Sullivan, 2015). A third study focused on the effects of shame resulting from reading racist tweets. In this study, 211 Asian Twitter users living in the United States were randomly assigned to read anti-Asian tweets, anti-Asian retweets, or nonracist tweets (control; Lee-Won, Lee, Song, & Borghetti, 2015). Shame in reaction to racist messages was not related to past frequency of alcohol consumption. Finally, a study of 83 Filipino Americans using methamphetamines found that greater shame related to substance use predicted lower frequency of methamphetamine use in the preceding 30 days, but not frequency of methamphetamine use before sex in the preceding 30 days. These relationships held after controlling for gender, age, country of birth, employment status, psychological control, depression and support from family and friends (Nemoto, Operario, & Soma, 2002).

Discussion

This systematic review aimed to synthesize all published studies examining empirical relationships between shame and substance consumption, and shame and substance use-related problems or dependence. The association (or lack thereof) between shame and substance use and substance use-related problems was complicated as it involved multiple types of studies, moderators, measures and populations with varying levels of substance use. Below, we discuss themes across studies, as well as potential mechanisms and moderators for future study.

Cross-Sectional Associations Between Shame and Substance Use

Our first meta-analysis found that people who report higher levels of shame, on average, do not consume more drugs and alcohol than those experiencing lower levels of shame, with an average weighted association of $r = .00$ In other words, people who report higher levels of shame, at a trait level, do not appear to use substances at a higher frequency than people who report lower levels of shame. As 11 of these studies assessed alcohol use and five assessed other

substances, this association is most representative of the association between shame and alcohol use. Additionally, this association is most representative of people who would not qualify for a diagnosis of SUD. From the perspective of clinical (Dearing et al., 2005; Lewis, 1971; Tangney et al., 2007) and cyclical models of shame (Dearing et al., 2005; Luoma et al., 2018; Weichelt, 2007), which view shame as solely maladaptive, this finding is unexpected.

While the most straightforward interpretation of the above results is that shame bears no relation to substance use, the more sophisticated study designs discussed in more detail below suggest that simple between-subjects models fail to take into account moderators that may determine when shame promotes versus inhibits substance use. If shame sometimes promotes and other times inhibits substance use, averaging associations from all studies could yield an observed effect near zero. The idea that shame can both lead to avoidance-based behaviors and also motivate self-improvement is in line with functional accounts of shame and a recent meta-analysis (Leach & Cidam, 2015) showing that shame is linked to constructive approach when one's failure or social image is perceived as repairable, while it is linked to avoidance when it is not. Unfortunately, no currently reviewed study has tested this hypothesis. Regardless, this null result points to the importance of more complex study designs that can identify the conditions under which shame may be linked to more or less substance use.

In interpreting the lack of between-subject associations between shame and substance use, it is important to note that results are based on a relatively small set of 14 samples including 3805 individuals, leaving open the possibility that this estimate may be skewed by a small number of influential studies. A wide variety of samples were included (SUD patients, incarcerated people, community drinkers, students, smokers and a mixed sample of people with and without a SUD), making it extremely unlikely that statistical power would be adequate to

detect group-based moderation effects. Another consideration is that the association observed is more characteristic of the relationship between shame and alcohol use in non-SUD samples, leaving open the possibility that a stronger association between shame and substance use may exist with certain drugs or in certain populations, but not others; for example, shame might show stronger effects in populations that are more highly stigmatized (such as SUD samples in treatment). In line with a functional view of shame, these individuals may perceive fewer routes to repair their shame-related failure or social image.

　　　Despite the small set of studies we reviewed, we identified one potential moderator of the association between shame and substance consumption: type of shame measure. Moderation analyses showed a trend toward experienced shame being slightly positively associated with substance consumption and proneness being slightly negatively associated with substance consumption. However, neither type of measure resulted in estimates significantly different than zero. Theoretically, it is possible that the overall zero association between shame and substance consumption is due to the averaging the positive association with experienced shame together with the negative association with shame proneness. However, given that the finding was a statistical trend and the relatively small sample of studies included, this interpretation should be considered speculative. At a theoretical level, one interpretation of the different associations between these two measures of shame and substance use is based on the idea that shame may be a consequence of high levels of substance use. If higher levels of use regularly resulted in shame, then experienced shame would be expected to be higher in those individuals. However, shame proneness, which is thought to measure a more general and enduring dispositional tendency to experience shame across a range of situations, would not be expected to be affected by current

levels of substance use. The result would be that experienced shame would be correlated with substance use in cross-sectional analyses, while shame proneness would not.

Cross-Sectional Associations Between Shame and Substance-Related Problems

The meta-analysis of 18 samples correlating shame with problems resulting from substance use found a small, but reliably different from zero, overall correlation of $r = .16$. This value is similar to that found in meta-analyses of the association between depression and substance use, which found average correlations of $r = .14$ between depression and cocaine frequency/impairment (Conner, Pinquart, & Holbrook, 2008), $r = .15$ between measures of depression and alcohol related impairment/frequency (Malouff, Thorsteinsson, Rooke, & Schutte, 2007), and $r = .21$ for depression and alcohol related frequency/impairment (Conner, Pinquart, & Gamble, 2009). In interpreting these effect sizes, it is important to keep in mind that effect sizes were not adjusted for reliability of the measures, making them inherently conservative. Also, the most commonly used measure of substance use problems, the AUDIT (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993), includes items on frequency of use, possibly attenuating the relationship between substance use-related problems and shame.

The 18 samples included a mixed SUD and clinical sample, one sample of people with SUDs, eight student samples, two samples of community adults (one of which had hazardous drinking levels), two incarcerated samples, one sample of hypersexual men, one sample of LGBTQ smokers, a sample of LGBTQ young adults, and one sample of injection drug users from Vietnam. Ten of the samples only assessed alcohol use, two assessed alcohol and other substances, and six assessed non-alcohol drug use. Thus, this correlation is most characteristic of student samples and problems related to alcohol use leaving open the possibility that shame may

be more strongly associated with substance use-related problems amongst particular populations or other substances.

These results are consistent with the idea that shame is a consequence of problematic patterns of substance use that result in perceived moral failures, norm violations, or failures of personal competence (Dearing et al., 2005; Gilbert, 1998; Lewis, 1971; Luoma et al., 2018; Tangney et al., 2007; Weichelt, 2007). Indeed, common measures of substance use-related problems, such as the Alcohol Use Disorders Test (AUDIT; Saunders et al., 1993), include items thatepre specifically assess perceived failures, for example, "how often during the last year have you failed to do what was expected to you because of your drinking?" This finding is also consistent with the cyclical models of addiction, which would expect that more problematic forms of substance use would be associated with higher levels of shame.

Even with the relatively small number of studies, one moderator of the relationship between shame and problems resulting from substance use was identified. Meta-regression analyses showed that as the percentage of participants who identified as either a woman or gender minority increased, the association between shame and substance-related problems strengthened. In other words, women and gender minorities (when combined into one group) showed a stronger association between shame and substance use-related problems than men. There was not enough data to separate gender minority participants from women, so it seems likely that this effect largely relates to cis-gender men and women. Perhaps some of the reasons for this difference may be that women (and perhaps gender minorities) may be more profoundly affected by the stigma related to substance use than men (McHugh, Votaw, Sugarman, & Greenfield, in press). At least one study (O'Connor, Berry, Inaba, Weiss, & Morrison, 1994) found that women in treatment for SUD evidenced more shame than men in treatment for SUD,

which may indicate that shame has a more important influence on their substance use than men.

This finding adds to the growing body of literature on differences between men and women in

relation to SUD (McHugh et al., 2017).

Four studies that compared SUD treatment samples to samples of people without SUD

also provided support for the idea that shame is associated with more problematic patterns of

substance use; these studies found that SUD samples had consistently higher levels of

experienced shame. The one study that measured shame proneness (Grynberg et al., 2017) found

no significant difference between those who are in treatment for SUDs and those who are not.

However, that study was only powered to find large effects, an unlikely result given our meta-

analysis. It should also be noted that the alcohol dependent sample in the study excluded anyone

with any other psychiatric disorder besides SUD. It's likely that this exclusion criteria restricted

the range of shame experienced in the sample, as shame correlates with a wide range of

psychiatric disorders and the majority of people diagnosed with SUD have at least one co-

occurring disorder. Additionally, those seeking treatment have even higher rates of comorbidity

(Grant et al., 2004). Together, the five studies reviewed confirm that people in treatment for

SUD typically experience heightened levels of shame. At least two sources for heightened shame

among people in SUD treatment seem likely. First, shame is likely to result from the kinds of

problems that would typically trigger the need for treatment, which often involve perceived

moral failures, norm violations, and failures of personal competence. Second, the process of

entering treatment itself can instigate a stigmatization process which can heighten shame

(Corrigan, 2004; Luoma et al., 2007).

Evidence for Shame as an Antecedent of Substance Use

In order to assess whether shame is an antecedent for substance use, as proposed in cyclical models of shame and substance use, more sophisticated designs that assess relationships over time and within-person are needed. If shame is associated with substance use in some contexts, but not others, then these types of studies are important in identifying potential moderators.

When studies examined whether shame predicted substance use months or years later, results were mixed. Three studies reported that shame predicted higher subsequent substance use. Two studies reported at least some findings in which shame predicted lower subsequent substance use. Finally, a third study reporting that reductions in shame during treatment were associated with more substance use at follow up. When considering these studies, it's important to note that five of the six studies assessed alcohol consumption, whereas only one assessed cigarette use and only two assessed other drugs. Thus, these results are most characteristic of shame predicting subsequent alcohol use. None of these studies included assessments of substance use-related consequences, which might be more reliably predicted by shame as shown in the second meta-analysis on the relationship between shame and substance use-related problems.

The most straightforward interpretation of these findings is that they reflect the same lack of association between shame and substance use documented in the meta-analysis of cross-sectional studies and therefore run counter to cyclical models of shame. However, de Hooge et al's (2008) concept and findings related to differential effects of "endogenous" versus "exogenous" shame might point to potential moderators for when shame might promote versus inhibit substance use. In this view, endogenous shame "is relevant for the decision at hand" (p. 933) and thereby more likely to motivate reparative action, compared to exogenous shame which

is not relevant to the current situation and thereby more likely to motivate avoidance. Using this

lens, shame resulting from substance use would be more relevant to the decision to cut back or

stop use and therefore might be more likely to motivate reduced use. The samples where shame

was associated with higher subsequent use (e.g., fifth graders, people sober for 2.5 months,

smokers in treatment) may have been experiencing less shame directly attributable to substance

use compared to the samples where shame was associated with lower subsequent use (e.g., a

residential treatment sample, hazardous drinkers, and an incarcerated sample). On the other hand,

the Randles and Tracy (2013) found that nonverbal shame predicted an increased likelihood or

relapse. In this study, nonverbal shame was assessed in reaction to a prompt to talk about a

negative incidence of drinking, suggesting that the shame that was elicited may have been linked

to substance use. Since shame due to substance use might motivate attempts to cut back on use,

those samples with higher proportions of this type of shame might be more likely to decrease

substance use in response to shame. On the other hand, those samples whose shame came mostly

from other sources would tend to use substances in order to avoid shame. Indeed, the only study

that did ask participants about shame specifically due to their substance use found that it

predicted less methamphetamine use (Nemoto et al., 2002).

Another set of studies examined whether shame serves as a more temporally proximal

risk factor for drinking. These studies examined whether fluctuations in state shame predicted

substance use at the same point in time, or over a defined subsequent interval (e.g., the next few

hours or days). Ultimately, a full understanding of any relationships between shame and

substance use behavior can only be understood by examining both within- and between-person

variations in shame and substance use. A number of authors have discussed the conceptual and

empirical importance of disentangling between- and within-subject relations (e.g., Wang &

Maxwell, 2015), which can be different in both magnitude and direction. For example, it is possible that within-subject fluctuations in shame could predict substance use at each time point without between-subject differences in shame predicting substance use. This could occur if the effects of shame on substance use were quadratic: for example, if the association between shame and use was positive from low-to-mid levels of shame and attenuated, or even became negative, from mid-to-high levels of shame. This kind of a quadratic effect would be likely to show that for people with low trait shame, increased shame relative to their relatively low baseline could be associated with more substance use at a given time point, whereas for people with high trait shame, increased shame relative to their relatively high baseline could be associated with less substance use at a given time point. The main take away is that within-subject associations are possible even in the absence of between-subject associations.

All four of the studies examining associations between shame and substance use within a more constrained time period found positive relationships between state shame and alcohol consumption for at least some of their samples. The samples that showed a positive relationship between state shame and substance use were two samples of college students (Giguere et al., 2014; Mohr et al., 2008), community drinkers (Luoma et al., 2018) who were low in shame, and a sample of healthy community controls (Holl et al., 2017). The trauma/SUD sample reported substance use that was high across all levels of shame and only slightly increased as shame increased. The main exception was the high shame community sample, which actually reported less frequent alcohol consumption at higher levels of shame (relative to their average levels). In this study, it important to note that these relationships were found only with solitary drinking.

The average levels of shame in these samples may contribute to these differing relationships. The samples who were probably experiencing relatively low levels of shame, on

average, found that state fluctuations in shame were positively associated with substance use. In contrast, the samples who were probably experiencing relatively high levels of shame (i.e., the high shame community sample and the trauma/SUD sample) either showed an attenuated or negative relationship between shame and substance use. Several factors could contribute to these differences. As already mentioned, one possibility is that the relationship between shame and substance use is quadratic, such that shame is negatively associated with substance use at higher levels of shame, while it is positively associated with substance use at lower levels of shame. Another possibility are issues related to restricted ranges, with those either on the low or the high end of the shame spectrum having relatively restricted or skewed responses in terms of shame or substance use, thus biasing results.

Studies of within-person fluctuations in shame also highlight the importance of social context. As shame is a social emotion that is thought to have evolved to regulate our membership in groups (Gilbert, 2003), it stands to reason that the social context of substance use may be particularly relevant. It is now well-established that the variables affecting alcohol consumption (and perhaps other substance use) are different in social contexts than in solitary contexts (Sayette, 2017). Indeed, the two studies which differentiated between social versus solitary drinking (Giguere et al., 2014; Luoma et al., 2018) only found relationships between shame and substance use in solitary drinking contexts. This makes sense given that shame elicits social withdrawal concurrently with avoidance. Taken together, these two studies provide some evidence supporting the theory that shame may be a more reliable trigger of solitary substance use (particularly alcohol use) than of social substance use. These results point to another possible moderator of the (lack of) association found between shame and substance use found in the meta-analysis—whether substance use was solitary or social. Perhaps shame serves mainly to

shift substance use from social to solitary contexts, rather than strongly affecting overall levels of substance use.

Evidence for Shame as a Consequence of Substance Use

Longitudinal studies that could inform whether shame is a consequence of substance use were sparse, with only three papers, including five studies, assessing whether substance use measured at one time point predicted shame at a later time point. Two papers found that that substance use can result in shame, but only under certain contexts. In a series of studies, Giguere et al. (2014) showed that college students who less strongly identified with their peer groups experienced more shame after occasions wherein they consumed more alcohol than their peers. In contrast, those who strongly identified with their peers did not experience shame after drinking, even after drinking more than their peers. One possible interpretation of these results is that the less strongly affiliated students were outsiders who experienced others as rejecting or ostracizing them, and thus tended to imagine others disapproving of them in reaction to transgressive events. Imagining other's disapproval and rejection in response to transgressive events has been shown to elicit shame in prior studies (e.g., Smith, Webster, Parrott, & Eyre, 2002).

This interpretation of Giguere et al. (2014) might also help explain the results of Luoma et al. (2018), who found a cross-level interaction (between and within subject interaction) wherein social drinking, but not solitary drinking, predicted shame the following day. Specifically, people who usually drank more in social contexts felt more shame when they drank more than usual, whereas people who usually drank less in social contexts felt less shame when they drank more than usual. It is possible that group norms are more salient in social drinking contexts. Perhaps only heavier drinkers exceeded these group norms on heavier drinking days. In

this way, excessive social drinking among heavier drinkers may have been more likely to elicit social emotions than excessive solitary drinking.

In contrast, the study that did not find a significant association between substance use and subsequent shame (Dodge & Clarke, 2018) assessed whether heavy drinking, in general, predicted shame a month later. In addition, a significant weakness of this study was that it summed an item measuring shame with an item measuring guilt, making it an impure measure of shame. Also, shame/guilt was measured thirty days after assessing the level of heavy drinking, rather than in reaction to a discrete drinking event, making the results more representative of drinking predicting increased shame/guilt over extended periods of time, rather than discrete drinking events predicting shame/guilt. In sum, these results are supportive of the idea that drinking, in certain contexts, can elicit shame over a shorter time period. The relationship between other drugs and subsequent shame was not assessed in any study.

Specific Types of Shame and Substance Use

A total of eight studies measured shame attributed to particular aspects of ones' identity or shame in response to specific situations. The most common topic was body shame, examined in four studies. Other studies examined shame related to aggression against an intimate partner, shame related to racist tweets, HIV related shame. One study assessed shame that participants indicated had stemmed directly from substance use (Nemoto et al., 2002) and was the only study in this review to do so. Conforming with meta-analytic findings, shame was weakly or inconsistently associated with substance use, per se. Body shame was more consistently associated with higher substance use than were other types of shame, but this was only based on a small sample of four studies, thus awaiting more replication.

Treatment and Prevention Implications

Results from our review suggest that shame may be important to address in treatment. Studies consistently found that levels of shame were elevated in SUD samples. Furthermore, our meta-analytic results show that shame is associated with substance use-related problems at a magnitude similar to the association between depression and substance use found in previous meta-analyses. Furthermore, these results indicate that shame can be both a protective and a risk factor for substance use, depending upon the context. For example, within-subject associations between shame and substance use over time suggest that, for people generally high in shame, increased state shame may serve to suppress substance use. For these people, risk for elevated substance use may actually be higher when state shame is relatively lower. Indeed, at least two studies of treatments that actively targeted shame found *higher* post-treatment shame in active treatment groups compared to TAU (i.e., Luoma et al., 2012; Malouf, Youman, Stuewig, Witt, & Tangney, 2017). Mediation analyses in Luoma et al. (2012) even suggested that the higher levels of shame in the group that received a treatment directly targeting shame may have even facilitated positive treatment effects.

It is possible that an accepting atmosphere is key in enabling people to translate shame into positive behavioral change rather than avoidance. Shame (which may increase awareness of a shortcoming), coupled with an accepting atmosphere (which may reduce defensiveness or a negative global appraisal of the self) could allow positive change to take place. This idea is in line with self-affirmation theory, which proposes that people seek to maintain a positive sense of self in which they view themselves as good, moral, and effective (Sherman & Cohen, 2006), a view that shame threatens. Indeed, in one study researchers found that a shame/guilt inducing stimuli led White people to support Black programs, but only if they also participated in a self-affirmation exercise (Harvey & Oswald, 2000). Thus, under certain conditions, shame may

motivate actions that can restore a positive sense of self (Leach & Cidam, 2015). In addition, cultural perceptions of shame could influence whether or not shame is constructive. For example, in some collectivistic cultures, the relational function of shame (i.e. maintaining social harmony) may prove more adaptive (Bedford & Hwang, 2003), with shame being a more common, and potentially less isolating, emotion (Cole, Bruschi, & Tamang, 2002).

In relation to prevention, the above findings provide limited evidence that shame may contribute to the development of SUDs. Longitudinal studies with better controls and larger samples are sorely needed, particularly ones that include potential moderators of the relationship between shame and subsequent substance use.

Limitations

A number of limitations of the above literature are important to note. The majority of the samples in the review (52.7%) focused only on alcohol, with 43.7% investigating illicit drug use, and 9.1% only cigarette use. This raises the possibility that results may differ across samples, especially samples using illicit drugs, which transgress societal norms (i.e., laws). In addition, most of the studies reviewed above measured shame as a global phenomenon versus an emotion directly attributable to substance use. This is important to note because shame relevant to the current situation (i.e., shame resulting from substance use) may have different effects than shame from other sources (de Hooge et al., 2008). A large number of different measures of shame were included in this review. These measures diverged strongly in their conceptualization of shame. In addition, method variance was substantial, with different types of self-report used as well as observational and transcript coding schemes. The effect of these various methods of measuring shame depends largely on more studies using each method so that they can be compared. Additionally, the small number of studies included as well as the relatively large number of

moderator analyses means that all tests of moderation and between-study heterogeneity should

be interested with caution. Simulation studies have shown that statistical metrics such as Q tests

and I2 estimates are extremely unreliable for meta-analyses with fewer than twenty studies

(Huedo-Medina, Sanchez-Meca, Marin-Martinez, & Botella, 2006). Finally, studies that might

elucidate potential mechanisms linking shame and substance use were beyond the scope of this

review.

Recommendations for Future Research

The overall pattern of results indicates that the association between shame and substance

use, per se, is weak and that models which hold that shame is invariably maladaptive need

revision. Rather than continuing to examine whether shame is associated with substance use at

an overall level, future studies should investigate potential moderators of this relationship. One

potential moderator is the perceived controllability of the failure which elicited shame, which has

been shown in a meta-analysis to moderate the association between shame and constructive

approach tendencies (Leach & Cidam, 2015). Another potential moderator is the source of

shame. Shame resulting from substance use itself might be more likely to motivate attempts to

reduce substance use than shame resulting from other sources. This may be particularly true if

substance use is perceived as controllable (another potential moderator). For example, those who

see their substance use as changeable and who perceive their shame as a direct consequence of

their substance use may be motivated to change their use in the service of restoring a more

positive sense of self, either in their eyes or the eyes of others. In contrast, those who see their

substance use as unchangeable or who attribute their shame to sources other than their substance

use may be less likely to try to change their substance use as a way to restore a more positive

sense of self.

While preliminary research suggests that the social context of consumption (e.g., peer group membership) and the violation of peer group norms are important, more research is needed to fully understand the contexts in which substance use results in shame. To accomplish this, future studies should directly measure other transgressive behaviors that could elicit shame, such as damaging relationships via drinking, neglecting obligations, or failing to manage one's health.

Methodological improvements are needed. Correlational studies are inadequate to characterize the dynamic relationships between emotion, cognition, social context, and substance use posited in cyclical models of shame and substance use. Prospective designs, daily process, or ecological momentary assessment approaches that allow for the characterization of within-person associations over time are needed. Experimental designs are needed to directly manipulate relevant variables and help identify potentially modifiable targets for intervention. In addition, researchers should carefully consider whether measures of shame proneness or experienced shame are more appropriate to their hypotheses and select measures accordingly. Nonverbal measures of shame should also be considered (e.g., Randles & Tracy, 2013) and novel measures of shame resulting from substance use would be useful. Given that two studies above linked shame to solitary, but not social drinking, future studies should consider this distinction.

As general negative affectivity has been shown to be associated with problematic use (Cheetham et al., 2010), it would be helpful if future studies included measures of neuroticism or trait affectivity to control for the strong association between shame and negative affect. Studies should consider the literature relating to shame and guilt and carefully select measurement strategies that address how shame overlaps with guilt (Tangney et al. 2000). Finally, as instability in affect predicts substance use (Mohr, Arpin, & Mccabe, 2015), variability in shame over time might be useful to study in predicting substance use.

Conclusion

This qualitative review and meta-analysis summarized the available research associating shame with substance use. Shame was reliably associated with substance use-related problems. However, the association between shame and substance use, per se, was complicated and appeared to depend on various moderating factors. Overall, data were more supportive of functional models of shame that hold that shame can have both adaptive and maladaptive functions, compared to models of shame that view shame as nearly always maladaptive. Given that shame is elevated in SUD samples and associated with substance related problems at a level similar to depression, more research is needed on the associations between shame and substance use in order to inform prevention and treatment efforts.

References

Baker, T. B., Piper, M. E., McCarthy, D. E., Majeskie, M. R., & Fiore, M. C. (2004). Addiction

    motivation reformulated: An affective processing model of negative reinforcement.

    Psychological Review, *111*(1), 33–51.

Bedford, O., & Hwang, K. K. (2003). Guilt and shame in Chinese culture: A cross-cultural

    framework from the perspective of morality and identity. *Journal for the Theory of Social*

    Behaviour, *33*(2), 127-144.

Boudrez, H. (2009). Psychological ractors and long-term abstinence after smoking cessation

    treatment. *Journal of Smoking Cessation, 4*(1), 10-17.

Carr, E. R., & Szymanski, D. M. (2010). Sexual objectification and substance abuse in young

    adult women. *The Counseling Psychologist, 39*(1), 39-66.

Cheetham, A., Allen, N. B., Yücel, M., & Lubman, D. I. (2010). The role of affective

    dysregulation in drug addiction. *Clinical Psychology Review*, *30*(6), 621–634.

Cibich, M., Woodyatt, L., & Wenzel, M. (2016). Moving beyond "shame is bad": How a

    functional emotion can become problematic. *Social and Personality Psychology*

    Compass, *10*(9), 471–483.

Cole, P. M., Bruschi, C. J., & Tamang, B. L. (2002). Cultural differences in children's emotional

    reactions to difficult situations. *Child Development*, *73*(3), 983-996.

Conner, K. R., Pinquart, M., & Gamble, S. A. (2009). Meta-analysis of depression and substance

    use among individuals with alcohol use disorders. *Journal of Substance Abuse Treatment*,

    37(2), 127–137.

Conner, K. R., Pinquart, M., & Holbrook, A. P. (2008). Meta-analysis of depression and

    substance use and impairment among cocaine users. *Drug and Alcohol Dependence*,

98(1–2), 13–23.

Cook, D. R. (1991). Shame, attachment, and addictions: Implications for family therapists. *Contemporary Family Therapy*, *13*(5), 405–419.

Cook, D. R. (1988). Measuring shame. *Alcoholism Treatment Quarterly, 4*(2), 197-215.

Cooper, M. L., Frone, M. R., Russell, M., & Mudar, P. (1995). Drinking to regulate positive and negative emotions: A motivational model of alcohol use. *Journal of Personality and Social Psychology*, *69*(5), 990–1005.

Corrigan, P. (2004). How stigma interferes with mental health care. *American Psychologist*, *59*(7), 614-625.

de Hooge, I. E., Breugelmans, S. M., & Zeelenberg, M. (2008). Not so ugly after all: When shame acts as a commitment device. *Journal of Personality and Social Psychology*, *95*(4), 933–943.

Dearing, R. L., Witkiewitz, K., Connors, G. J., & Walitzer, K. S. (2013). Prospective changes in alcohol use among hazardous drinkers in the absence of treatment. *Psychology of Addictive Behaviors, 27*(1), 52-61.

Dearing, R. L., Stuewig, J., & Tangney, J. P. (2005). On the importance of distinguishing shame from guilt: Relations to problematic alcohol and drug use. *Addictive Behaviors*, *30*(7), 1392–1404.

Declerck, C. H., Boone, C., & Kiyonari, T. (2014). No place to hide: When shame causes proselfs to cooperate. *The Journal of Social Psychology*, *154*(1), 74–88.

Dodge, T., & Clarke, P. (2018). Testing weight motives and guilt/shame as mediators of the relationship between alcohol use and physical activity. *Addictive Behaviors, 77*, 131-136.

Field, A. P., & Gillett, R. (2010). How to do a meta-analysis. *British Journal of Mathematical*

and Statistical Psychology, 63(3), 665-694.

Fiissel, D. L., & Lafreniere, K. D. (2006). Weight control motives for cigarette smoking: Further consequences of the sexual objectification of women? *Feminism & Psychology, 16*(3), 327-344.

Fisher, R. A. (1921). On the probable error of a coefficient of correlation deduced from a small sample. *Metron*, *1*, 3-32.

Giguere, B., Lalonde, R. N., & Taylor, D. M. (2014). Drinking too much and feeling bad about it? How group identification moderates experiences of guilt and shame following norm transgression. *Personality and Social Psychology Bulletin*, *40*(5), 617–632.

Gilbert, P. (2003). Evolution, social roles, and the differences in shame and guilt. *Social Research: An International Quarterly*, *70*(4), 1205-1230.

Gilbert, P. (1998). What is shame? Some core issues and controversies. In P. Gilbert & B. Andrews (Eds.), *Shame: Interpersonal Behavior, Psychopathology, and Culture* (pp. 3–38). New York: Oxford University Press.

Grant, B. F., Stinson, F. S., Dawson, D. A., Chou, S. P., Dufour, M. C., Compton, W., . . . Kaplan, K. (2004). Prevalence and co-occurrence of substance use disorders and independentmood and anxiety disorders: Results from the national epidemiologic survey on alcohol and relatedconditions. *Archives of General Psychiatry, 61*(8), 807-816.

Grynberg, D., de Timary, P., Van Heuverswijn, A., & Maurage, P. (2017). Prone to feel guilty: Self-evaluative emotions in alcohol-dependence. *Drug and Alcohol Dependendence, 179*, 78-82.

Harvey, R. D., & Oswald, D. L. (2000). Collective guilt and shame as motivation for White support of Black programs. *Journal of Applied Social Psychology*, *30*(9), 1790-1811.

Hedges, L. V., & Vevea, J. L. (1998). Fixed-and random-effects models in meta-analysis.

Psychological Methods, 3(4), 486.

Hequembourg, A. L., & Dearing, R. L. (2013). Exploring shame, guilt, and risky substance use

among sexual minority men and women. *Journal of Homosexuality*, *60*(4), 615-638.

Holl, J., Wolff, S., Schumacher, M., Hocker, A., Arens, E. A., Spindler, G., . . . Barnow, S.

(2017). Substance use to regulate intense posttraumatic shame in individuals with

childhood abuse and neglect. *Development and Psychopathology, 29*(3), 737-749.

Huedo-Medina, Tania; Sanchez-Meca, Julio; Marin-Martinez, Fulgencio; and Botella, Juan

(2006). Assessing heterogeneity in meta-analysis: Q statistic or I2 index?. *CHIP

Documents*, 19.

Hunter, J. E., & Schmidt, F. L. (2004). *Methods of Meta-Analysis: Correcting Error and Bias in

Research Findings*. Thousand Oaks: SAGE Publications.

Keltner, D. (1995). Signs of appeasement: Evidence for the distinct displays of embarrassment,

amusement, and shame. *Journal of Personality and Social Psychology*, *68*(3), 441–454.

Keltner, D., Young, R. C., & Buswell, B. N. (1997). Appeasement in human emotion, social

practice, and personality. *Aggressive Behavior*, *23*(5), 359–374.

Koob, G. F., & Le Moal, M. (1997). Drug abuse: Hedonic homeostatic dysregulation. *Science,

278*(5335), 52-58.

Lamont, J. M. (2015). Trait body shame predicts health outcomes in college women: A

longitudinal investigation. *Journal of Behavioral Medicine, 38*(6), 998-1008.

Leach, C. W., & Cidam, A. (2015). When is shame linked to constructive approach orientation?

A meta-analysis. *Journal of Personality and Social Psychology*, *109*(6), 983–1002.

Lee-Won, R. J., Lee, J. Y., Song, H., & Borghetti, L. (2015). "To the bottle I go . . . to drain my

strain": Effects of microblogged racist messages on target group members' intention to drink alcohol. *Communication Research, 44*(3), 388-415.

Lewis, H. B. (1971). Shame and guilt in neurosis. *Psychoanalytic Review, 58*(3), 419.

Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. A., . . . Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: Explanation and elaboration. *PLOS Medicine, 6*(7), e1000100.

Lickel, B., Kushlev, K., Savalei, V., Matta, S., & Schmader, T. (2014). Shame and the motivation to change the self. *Emotion, 14*(6), 1049-1061.

Light, R. J., & Pillemer, D. B. (1984). Summing Up: The Science of Reviewing Research. *Harvard Unviersity Press, 15*(8), 16-17.

Littleton, H., Radecki Breitkopf, C., & Berenson, A. (2005). Body image and risky sexual behaviors: An investigation in a tri-ethnic sample. *Body Image, 2*(2), 193-198.

Luoma, J. B., Guinther, P. M., Lawless DesJardins, N. M., & Vilardaga, R. (2018). Is shame a proximal trigger for drinking? A daily process study with a community sample. *Experimental and Clinical Psychopharmacology, 26*(3), 290-301.

Luoma, J., Guinther, P., Potter, J., & Cheslock, M. (2017). Experienced-based versus scenario-based assessments of shame and guilt and their relationship to alcohol consumption and problems. *Substance Use and Misuse*, *52*(13), 1692-1700.

Luoma, J. B., Kohlenberg, B. S., Hayes, S. C., & Fletcher, L. (2012). Slow and steady wins the race: A randomized clinical trial of acceptance and commitment therapy targeting shame in substance use disorders. *Journal of Consulting and Clinical Psychology, 80*(1), 43-53.

Luoma, J. B., Twohig, M. P., Waltz, T., Hayes, S. C., Roget, N., Padilla, M., & Fisher, G.

(2007). An investigation of stigma in individuals receiving treatment for substance abuse.

Addictive Behaviors, *32*(7).

Malouff, J. M., Thorsteinsson, E. B., Rooke, S. E., & Schutte, N. S. (2007). Alcohol involvement

and the five-factor model of personality: A meta-analysis. *Journal of Drug Education*,

37(3), 277–294.

Malouf, E. T., Youman, K., Stuewig, J., Witt, E. A., & Tangney, J. P. (2017). A pilot RCT of a

values-based mindfulness group intervention with jail inmates: Evidence for reduction in

post-release risk behavior. *Mindfulness, 8*(3), 603–614.

Mason, M. (1991). Women and shame: Kin and culture. In C. Bepko (Ed.), *Feminism and

Addiction* (175-194). New York: The Howarth Press.

McHugh, R. K., Votaw, V. R., Sugarman, D. E., & Greenfield, S. F. (in press). Sex and gender

differences in substance use disorders. *Clinical Psychology Review*.

Meehan, W., O'Connor, L. E., Berry, J. W., Weiss, J., Momson, A., & Acampora, A. (1996).

Guilt, shame, and depression in clients in recovery from addiction. *Journal of

Psychoactive Drugs, 28*(2), 125-134.

Merikangas, K. R., He, J. P., Burstein, M., Swanson, S. A., Avenevoli, S., Cui, L., ... &

Swendsen, J. (2010). Lifetime prevalence of mental disorders in US adolescents: Results

from the National Comorbidity Survey Replication–Adolescent Supplement (NCS-

A). *Journal of the American Academy of Child & Adolescent Psychiatry*, *49*(10), 980-

989.

Mohr, C. D., Arpin, S., & Mccabe, C. T. (2015). Daily affect variability and context-specific

alcohol consumption. *Drug and Alcohol Review*, *34*(6), 581–587.

Mohr, C. D., Brannan, D., Mohr, J., Armeli, S., & Tennen, H. (2008). Evidence for positive

  mood buffering among college student drinkers. *Personality and Social Psychology*

  Bulletin, 34(9), 1249-1259.

Nemoto, T., Operario, D., & Soma, T. (2002). Risk behaviors of Filipino methamphetamine

  users in San Francisco: Implications for prevention and treatment of drug use and HIV.

  Public Health Reports, 117 Suppl 1, S30-38.

O'Connor, L. E., Berry, J. W., Inaba, D., Weiss, J., & Morrison, A. (1994). Shame, guilt, and

  depression in men and women in recovery from addiction. *Journal of Substance Abuse*

  Treatment, *11*(6), 503–510.

Potter-Efron, R. T. (2002). *Shame, guilt, and alcoholism: Treatment issues in clinical practice*.

  Binghamton, NY: Haworth Press.

Rahim, M., & Patton, R. (2015). The association between shame and substance use in young

  people: A systematic review. *PeerJ, 3*, e737.

Randles, D., & Tracy, J. L. (2013). Nonverbal displays of shame predict relapse and declining

  health in recovering alcoholics. *Clinical Psychological Science, 1*(2), 149-155.

Rivera, A. V., DeCuir, J., Crawford, N. D., Amesty, S., Harripersaud, K., & Lewis, C. F. (2015).

  Factors associated with HIV stigma and the impact of a nonrandomized multi-component

  video aimed at reducing HIV stigma among a high-risk population in New York. *AIDS*

  Care, 27(6), 772-776.

Rosenthal, R. (1991). *Meta-analytic procedures for social research*. Thousand Oaks: SAGE.

Satel, S. (2007). In praise of stigma. In J. E. Henningfield, P. B. Santora, & W. K. Bickel (Eds.),

  Addiction Treatment: Science and Policy for the Twenty-first Century (pp. 147–151).

  Baltimore, MD: Johns Hopkins University Press.

Saunders, J. B., Aasland, O. G., Babor, T. F., De la Fuente, J. R., & Grant, M. (1993).

Development of the alcohol use disorders identification test (AUDIT): WHO

collaborative project on early detection of persons with harmful alcohol consumption-

II. *Addiction*, *88*(6), 791-804.

Sayette, M. A. (2017). The effects of alcohol on emotion in social drinkers. *Behaviour Research

and Therapy*, *88*, 76–89.

Sherman, D. K., & Cohen, G. L. (2006). The psychology of self-defense: Self-affirmation

theory. *Advances in Experimental Social Psychology*, *38*, 183-242.

Smith, R. H., Webster, J. M., Parrott, W. G., & Eyre, H. L. (2002). The role of public exposure

in moral and nonmoral shame and guilt. *Journal of Personality and Social

Psychology*, *83*(1), 138-159.

Stuewig, J., Tangney, J. P., Kendall, S., Folk, J. B., Meyer, C. R., & Dearing, R. L. (2015).

Children's proneness to shame and guilt predict risky and illegal behaviors in young

adulthood. *Child Psychiatry & Human Development, 46*(2), 217-227.

Stuewig, J., Tangney, J. P., Mashek, D., Forkner, P., & Dearing, R. (2009). The moral emotions,

alcohol dependence, and HIV risk behavior in an incarcerated sample. *Substance Use &

Misuse, 44*(4), 449-471.

Tangney, J.P., Dearing, R.L. (2002). *Shame and Guilt.* The Guilford Press, New York.

Tangney, J. P., Dearing, R. L., Wagner, P. E., & Gramzow, R. (2000). The Test of Self-

Conscious Affect–3 (TOSCA-3). Fairfax, VA: George Mason University.

Tangney, J. P., Folk, J. B., Graham, D. M., Stuewig, J. B., Blalock, D. V., Salatino, A., . . .

Moore, K. E. (2016). Changes in inmates' substance use and dependence from pre-

incarceration to one year post-release. *Journal of Criminal Justice, 46*, 228-238.

Tangney, J. P., Stuewig, J., & Mashek, D. J. (2007). Moral emotions and moral behavior. *Annual*

    Review of Psychology, *58*, 345–372.

Tangney, J. P., Stuewig, J., Mashek, D., & Hastings, M. (2011). Assessing jail inmates'

    proneness to shame and guilt: Feeling bad about the behavior or the self? *Criminal*

    Justice and Behavior, 38(7), 710-734.

Treeby, M., & Bruno, R. (2012). Shame and guilt-proneness: Divergent implications for

    problematic alcohol use and drinking to cope with anxiety and depression

    symptomatology. *Personality and Individual Differences, 53*(5), 613-617.

Treeby, M. S., Rice, S. M., Cocker, F., Peacock, A., & Bruno, R. (2018). Guilt-proneness is

    associated with the use of protective behavioral strategies during episodes of alcohol use.

    Addictive Behaviors, 79, 120-123.

Viney, L. L., Westbrook, M. T., & Preston, C. (1985). Sources of anxiety in drug addiction.

    Journal of Clinical Psychology, 41(1), 124-129.

Wang, L. P., & Maxwell, S. E. (2015). On disaggregating between-person and within-person

    effects with longitudinal data using multilevel models. *Psychological Methods*, *20*(1),

    63–83.

Weiss, N. H., Duke, A. A., Overstreet, N. M., Swan, S. C., & Sullivan, T. P. (2015). Intimate

    partner aggression-related shame and posttraumatic stress disorder symptoms: The

    moderating role of substance use problems. *Aggressive Behavior, 42*(5), 427-440.

Whiteford, H. A., Ferrari, A. J., Degenhardt, L., Feigin, V., & Vos, T. (2015). The global burden

    of mental, neurological and substance use disorders: An analysis from the Global Burden

    of Disease Study 2010. *PLoS ONE, 10*(2), e0116820.

Wiechelt, S. A. (2007). The specter of shame in substance misuse. *Substance Use & Misuse*,

42(2–3), 399–409.

Figure 1

Forest plot representing mean weighted effect sizes and 95% confidence intervals for associations of shame and substance consumption.
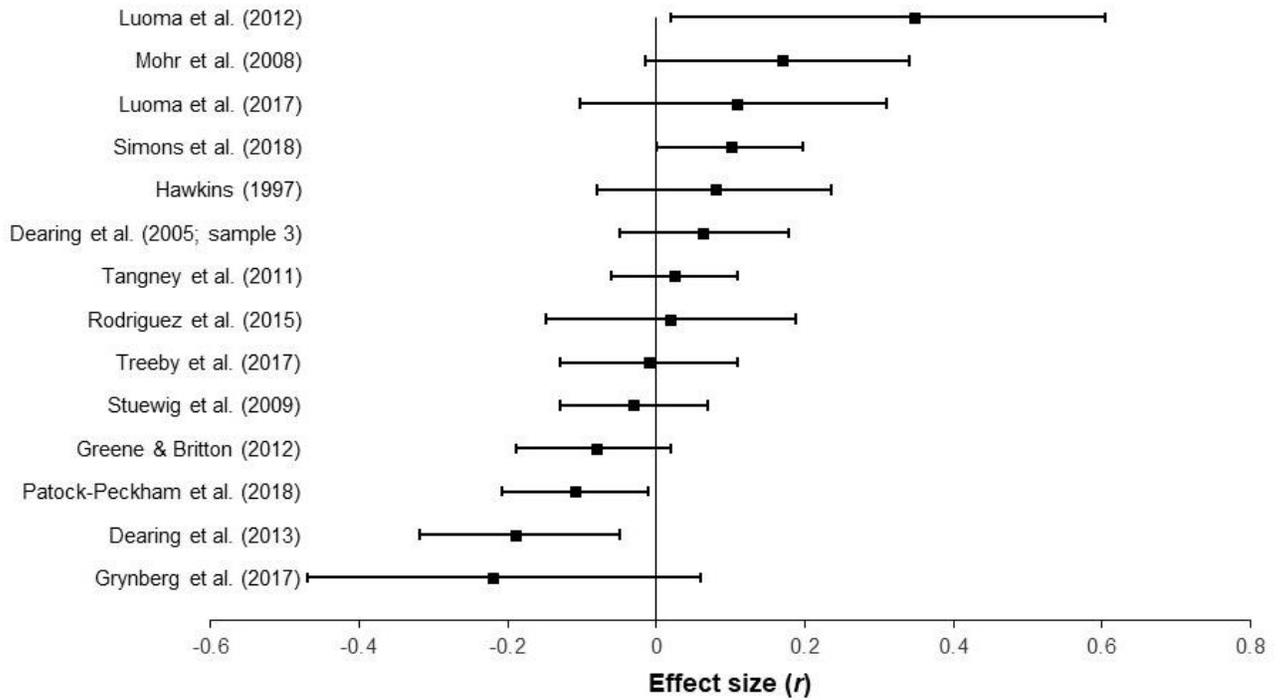
Figure 2

Forest plot representing mean weighted effect sizes and 95% confidence intervals for associations of shame and substance use-related problems.
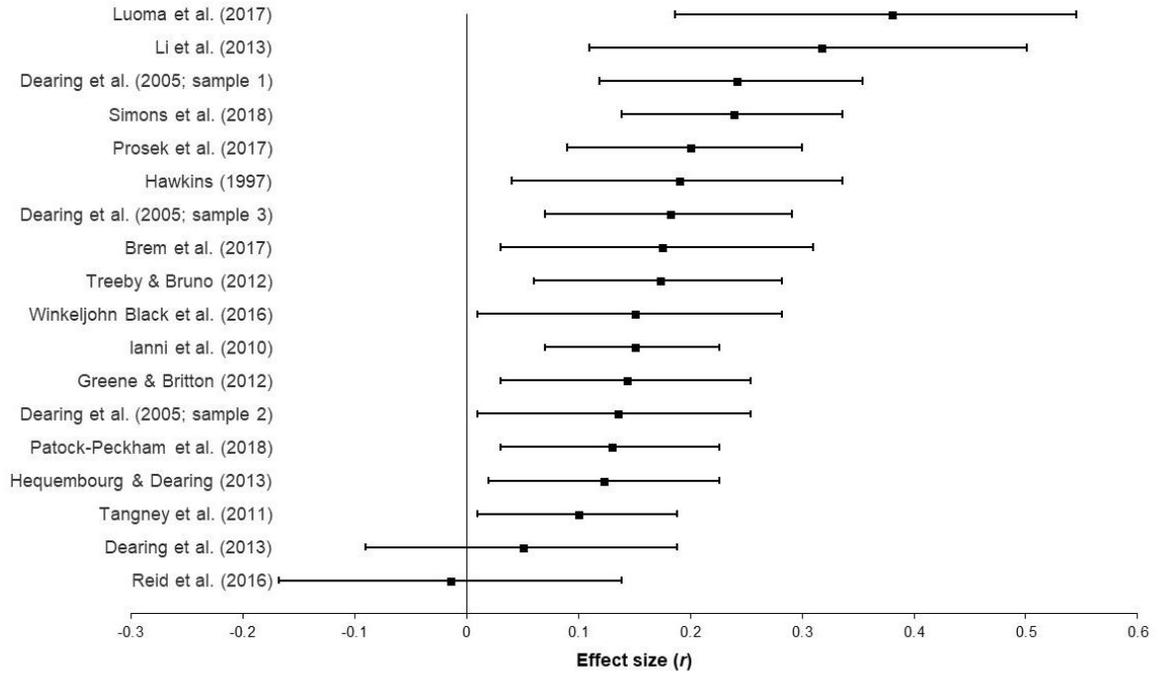
Appendix A

Published Studies Included in the Current Review by Year
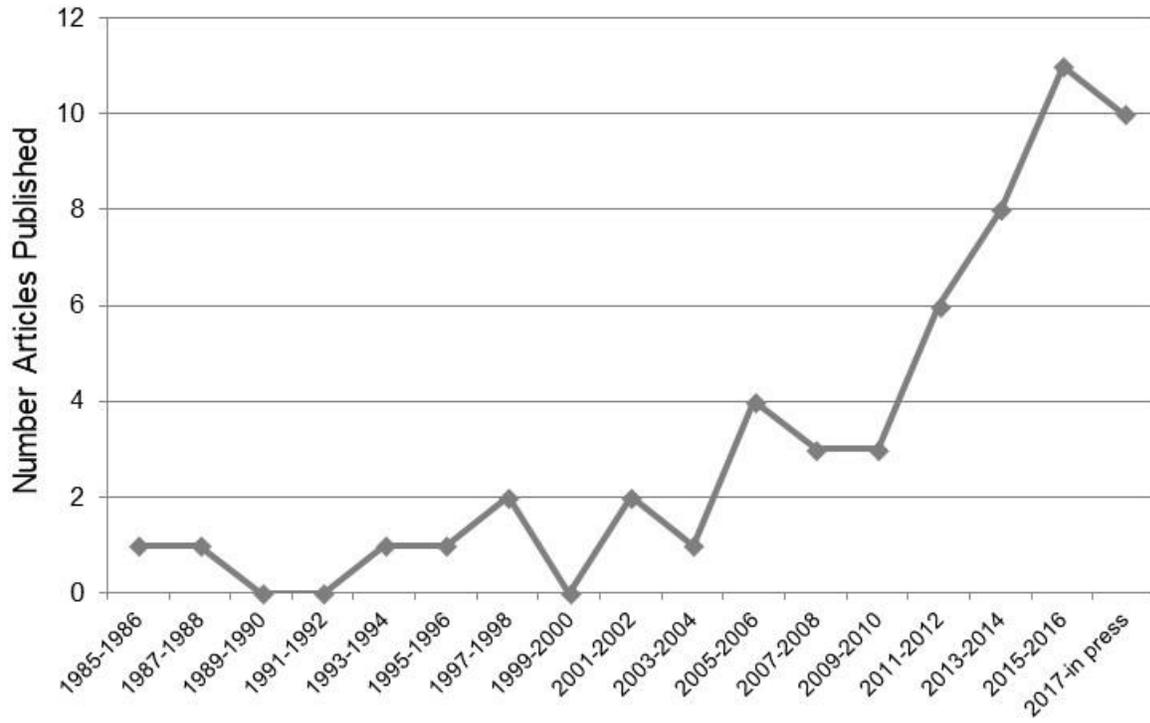
Appendix B

PRISMA Diagram Outlining Study Selection
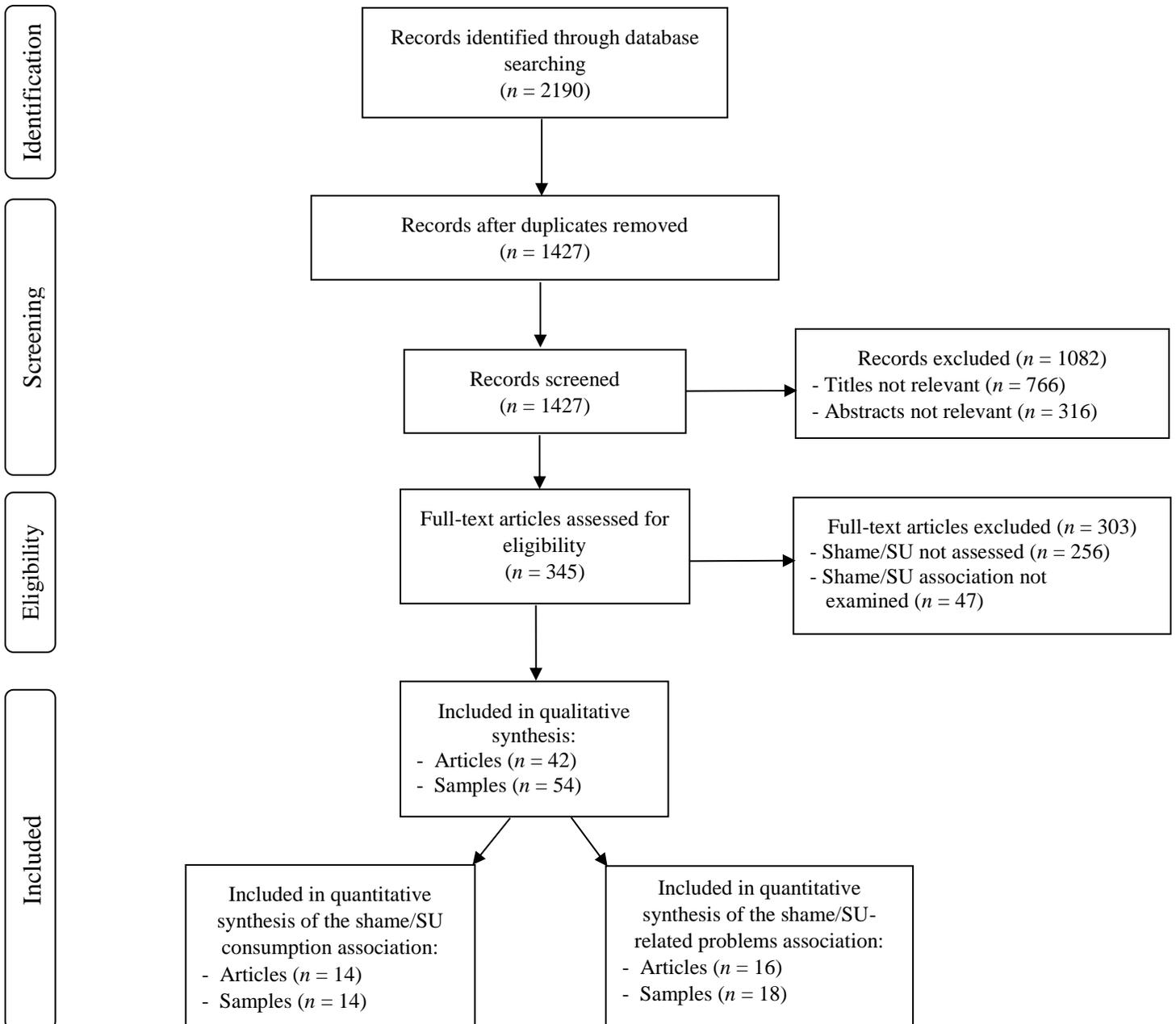
Appendix C

Funnel Plot Depicting Effect Size (r) as a Function of Sample Size for the Association Between

Shame and Substance Consumption

Appendix D

Funnel Plot Depicting Effect Size (r) as a Function of Sample Size for the Association Between

Shame and Substance Use-Related Problems

Appendix E

Descriptive Summary of Included Studies

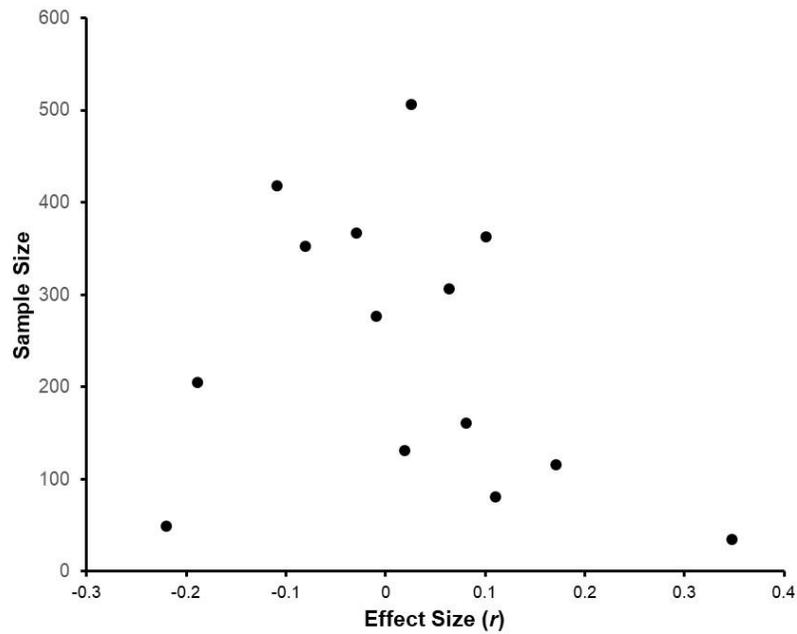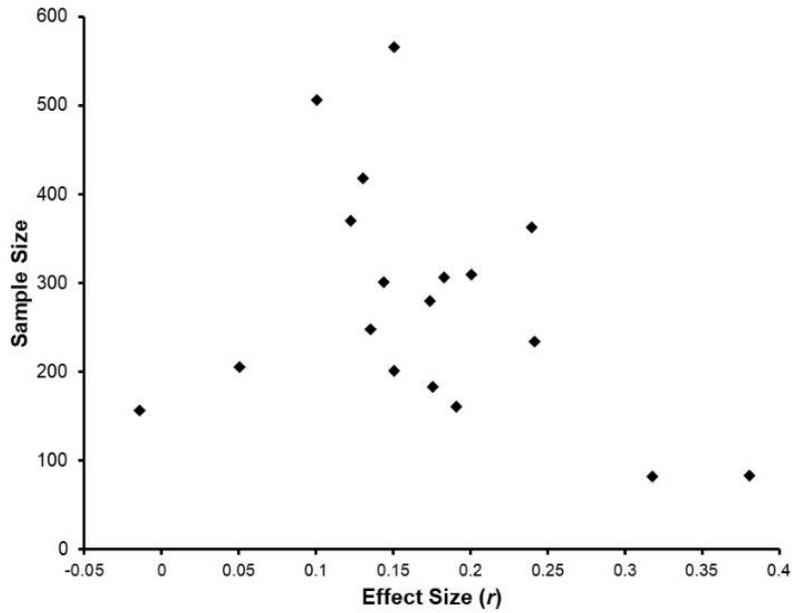| Author(s)	Year	N	Sample	Study Type	Substance Type	Substance Use Measure	Shame Measure	Mean Age (SD)	% Other Than Men	% White
Boudrez	2009	124	People in smoking cessation program	Prospective (8 years)	Cigarettes	FTND, smoking relapse	NEO-PI-R (shame factor)	42.9 (10.6)	62.9	Not reported
Brem et al.	2017	184	SUD	Cross-sectional (correlational)	Drugs (general)	AUDIT, DUDIT	YSQ-L3	40.8 (9.9)	0.0	89.3
Carr & Szymanski	2011	289	College students	Cross-sectional (correlational)	Alcohol, Cigarettes, Drugs	Cigarette use, PAI	OBCS-BS	10.0 (2.3)	100.0	89.0
Dearing et al.	2005									
Sample 1		235	College students	Cross-sectional (correlational)	Drugs (general)	MCMI-II	TOSCA, TOSCA-GFS	20.2 (5.1)	75.3	48.5
Sample 2		249	College students	Cross-sectional (correlational)	Drugs (general)	MCMI-III	TOSCA, TOSCA-GFS	20.1 (4.3)	81.9	57.0
Sample 3		332	Incarcerated	Cross-sectional (correlational)	Drugs (general)	DSM-IV dependence/use, PAI, TCU-CRTF	TOSCA-SD, TOSCA-SD-GFS	31.4 (9.6)	10.0	34.0
Dearing et al.	2013	206 at baseline	Community adults with hazardous drinking levels	Prospective (2 years)	Alcohol	ADS, TLFB (% heavy drinking days)	TOSCA	36.1 (12.4)	47.6	68.4
Dodge & Clarke	2018	318-340	College students	Prospective (1 month)	Alcohol	Heavy drinking	PANAS	19.4 (1.6)	70.6	70.0
Fiissel & Lafreniere	2006	146	College students	Cross-sectional (correlational)	Cigarettes	Smoking status	OBCS-BS	22.9 (6.4)	100.0	71.9
Giguere & Taylor	2014									
Sample 1		110	College students	Cross-sectional (correlational)	Alcohol	Event-related consumption	SSGS (modified)	19.3	57.3	not reported
Sample 2		102	College students	Cross-sectional (correlational)	Alcohol	Event-related consumption	SSGS (modified)	19.8	51.0	not reported

Author(s)	Year	N	Sample	Study Type	Substance Type	Substance Use Measure	Shame Measure	Mean Age (SD)	% Other Than Men	% White
Sample 3		84	College students	Cross-sectional (correlational)	Alcohol	Event-related consumption	SSGS (modified)	20.5	47.6	not reported
Sample 4		152	College students	Prospective (7 days)	Alcohol	Event-related consumption	SSGS (modified)	21.9	55.3	Not reported
Greene & Britton	2012	361	LGBTQ cigarette smokers	Cross-sectional (correlational)	Cigarettes, Alcohol	AUDIT, HIS	CoSS	35 (12.8)	33.8	80.0
Grynberg et al.	2017									
Sample 1		25	SUD	Cross-sectional (comparison group)	Alcohol	Consumption	PFQ-2, TOSCA	48.2 (10.9)	44.0	Not reported
Sample 2		25	Healthy controls	Cross-sectional (comparison group)	Alcohol	Consumption	PFQ-2, TOSCA	48.2 (11.1)	36.0	Not reported
Hawkins	1997									
Sample 1		129	Outpatients with depression and SUD	Cross-sectional (comparison group)	Alcohol	Consumption, SMAST	ISS	37.5	51.2	74.4
Sample 2		143	Healthy controls	Cross-sectional (comparison group)	Alcohol	Consumption, SMAST	ISS	33.8 (7.9)	74.8	71.3
Hequembourg & Dearing	2013	389	LGBTQ young adults	Cross-sectional (correlational)	Drugs (general)	AUDIT, DIS (dependence)	TOSCA, TOSCA-GFS	24.4 (4.3)	52.7	59.1
Holl et al.	2016									
Sample 1		55	SUD and trauma	EMA (comparison groups; 14 days)	Drugs (general)	Daily SU coping	Daily report (single item)	30.4 (10.2)	34.5	Not reported
Sample 2		53	Healthy control (no SUD, no trauma)	EMA (comparison groups; 14 days	Drugs (general)	Daily SU coping	Daily report (single item)	35.2 (14.1)	79.2	Not reported
Sample 3		43	SUD (no trauma)	EMA (comparison groups; 14 days	Drugs (general)	Daily SU coping	Daily report (single item)	32.0 (14.0)	72.1	Not reported

Author(s)	Year	N	Sample	Study Type	Substance Type	Substance Use Measure	Shame Measure	Mean Age (SD)	% Other Than Men	% White
Ianni et al.	2010	567	College students	Cross-sectional (correlational)	Alcohol	AUDIT	SSGS	22.9	Not reported	Not reported
Lamont	2015	141	College students	Prospective (3 months)	Smoking	Consumption	OBCS-BS	20.0 (1.1)	100.0	Not reported (mostly white)
Lee-Won et al.	2017	211	Asian-American Twitter users	Experimental	Alcohol	Frequency	State shame	30.4 (7.9)	50.2	0
Li et al.	2013	83	PWID in Vietnam	Cross-sectional (correlational)	Injected drugs	ASI	IS	33.7 (6.8)	100.0	Not reported (Vietnamese)
Littleton et al.	2005	1547	Women visiting family planning clinics	Cross-sectional (correlational)	Alcohol	Binge drinking frequency	OBCS-BS	25 (7.5)	0.0	34.5
Luoma et al.	2018	70	Community adults	Daily process study (21 days)	Alcohol	AUDIT, Daily consumption	ISS, SSGS (daily report)	34.3 (12.9)	68.6	82.0
Luoma et al.	2017	89	Community adults	Cross-sectional (correlational)	Alcohol	AUDIT, TLFB	ISS, SSGS, TOSCA-GFS	33.8 (12.8)	64.0	82.0
Luoma et al.	2012	133	SUD	RCT	Drugs (general)	TLFB (consumption)	ISS	33.6	45.9	86.0
Meehan et al.	1996	87	SUD	Cross-sectional (comparison group)	Alcohol	N/A	TOSCA	33 (8.8)	32.2	23.0
Mohr et al.	2008	118	College students	Daily process study (21 days)	Alcohol	Daily consumption	Ashamed mood (daily report)	18.9 (1.2)	56.8	91.5
Nemoto et al.	2002	83	Filipino Americans using methamphetamines	Cross-sectional (correlational)	Methamphetamines	NIDA Risk Behavior Assessment	Shame about DU	29.0 (8.8)	18.1	0.0
O'Connor et al.	1994									
Sample 1		104	SUD	Cross-sectional (comparison group)	Drugs (general)	N/A	TOSCA	33 (8.8)	31.7	23.0

Author(s)	Year	N	Sample	Study Type	Substance Type	Substance Use Measure	Shame Measure	Mean Age (SD)	% Other Than Men	% White
Sample 2		427	Healthy controls	Cross-sectional (comparison group)	Drugs (general)	N/A	TOSCA	Not reported	56.4	Not reported
Patock-Peckham et al.	2018	419	College students	Cross-sectional (correlational)	Alcohol	Consumption, PAUM	TOSCA	20.2 (3.0)	46.8	58.2
Pawlukewicz	2004	75	SUD (recovery from alcohol problems)	Correlational (correlational)	Alcohol	TLFB	AAII	Not reported	50.0	Not reported
Prosek et al.	2017	310	College students	Cross-sectional (correlational)	Alcohol	AUDIT	ESS	20.2 (1.7)	58.1	57.1
Randles & Tracy	2013	105 at Wave 1; 46 at Wave 2	Newly sober people from AA	Prospective (4 months)	Alcohol	TLFB (relapse)	Nonverbal shame, SSGS	38.7 (9.6)	54.3	76.0
Reid et al.	2016	157	Hypersexual men	Cross-sectional (correlational)	Drugs (general)	AUDIT, DAST	SI	42.7	0.0	88.6
Rivera et al.	2015	716	Pharmacy customers (non-prescription syringe customers an under/uninsured	Cross-sectional (correlational)	Injected drugs	Injection drug use	HIV-related shame	Not reported	Not reported	Not reported (51% Latino/ Hispanic, 36% Black)
Rodriguez et al.	2016	265	College students	Experimental	Alcohol	DDQ	TOSCA (modified state version)	22.03 (4.6)	74.0	66.8
Simons et al.	2018	364	College students	Cross-sectional (correlational)	Alcohol	DDQ-M, YAACQ	YSQ-S3	19.4 (1.5)	72.0	88.5
Stuewig et al.	2015	380 5th graders; 258 young adults	5th graders and young adults	Prospective (8-11 years)	Drugs (general)	Frequency	TOSCA-C-GFS	18.7 (.8)	59.3	62.4
Stuewig et al.	2009	356-362	Incarcerated	Cross-sectional	Alcohol, Needle use	TCU-CRTF	TOSCA-SD, TOSCA-SD-GFS	31.2 (9.7)	0.0	33.0

Author(s)	Year	N	Sample	Study Type	Substance Type	Substance Use Measure	Shame Measure	Mean Age (SD)	% Other Than Men	% White
Tangney et al.	2016	305	Incarcerated	Prospective (pre-incarceration to 1st year post-release)	Drugs (general)	DSM-IV (dependence), TCU-CRTF	TOSCA-SD-GFS	33.5 (10.2)	28.5	36.0
Tangney et al.	2011	550	Incarcerated	Cross-sectional (correlational)	Drugs (general)	Dependence, frequency, PAI	TOSCA-SD, TOSCA-SD-GFS	32 (10)	31.1	36.0
Treeby & Bruno	2012	281	College students	Cross-sectional (correlational)	Alcohol	APSI, AUDIT, YAACQ	TOSCA, TOSCA-GFS	22.2 (7.8)	73.7	90.0
Treeby et al.	2017	281	College students	Cross-sectional (correlational)	Alcohol	Consumption	TOSCA, TOSCA-GFS	22.2 (7.8)	73.7	90.0
Viney et al.	1985									
Sample 1		60	SUD	Cross-sectional (comparison group)	Drugs (general)	N/A	TAS	Not reported (17-41)	28.3	Not reported
Sample 2		Not reported	Control group (unemployed people)	Cross-sectional (comparison group)	Drugs (general)	N/A	TAS	Not reported (matched for age)	Not reported (matched for gender)	Not reported
Sample 3		Not reported	Control group (college students)	Cross-sectional (comparison group)	Drugs (general)	N/A	TAS	Not reported (matched for age)	Not reported (matched for gender)	Not reported
Weiss et al.	2016	369	DV survivors who recently used physical aggression against partner	Cross-sectional (correlational)	Drugs (general)	AUDIT, DAST	IPARS	36.7 (9.0)	100.0	28.0
Winkeljohn Black et al.	2016	202	College students	Cross-sectional (correlational)	Alcohol	RAPI	PFQ-2	19.5 (1.4)	66.5	76.6

Note. AA = Alcoholics Anonymous, AAII = Acceptance of an Alcoholic Identity Instrument (Pawlukewicz, 2004), ADS = Alcohol Dependence Scale (Skinner & Allen, 1982; Skinner & Horn, 1984), APSI = Alcohol Problem Severity Index (Kahler, Strong, and Read, 2005), ASI = Addiction Severity Index (McLellan et al., 1992), AUDIT = Alcohol Use Disorders Identification Test (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993; Babor, Higgins-Biddle, Saunders, & Monteiro, 2001), CoSS = The Compass of Shame Scale: avoidant shame-focused coping, and attack self shame-focused coping subscales (Elison, Lennon, & Pulos, 2006), DAST = Drug Abuse Screening Test (Skinner, 1982), DDQ = Daily Drinking Questionnaire (Collins, Parks, & Marlatt, 1985), DDQ-M = Modified Daily Drinking Questionnaire (Collins, Parks, & Marlatt, 1985; Dimeff, Baer, Kivlahan, & Marlatt, 1999)., DSM-IV = Diagnostic and Statistical

Manual of Mental Disorders, 4th Edition (American Psychiatric Association, 1994) , DIS = Diagnostic Interview Schedule (Robins & Regier, 1991) , DUDIT = Drug Use Disorders Identification Test (Stuart et al. 2003a, b), DV = domestic violence, EMA = ecological momentary assessment, ESS = Experiential Shame Scale (Turner, 1998), FTND = Fagerstrom Test for Nicotine Dependence (Etter, 2005; Fagerstrom & Furberg, 2008; Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991; Richardson & Ratner, 2005), HIS = Heaviness of Smoking Index (Borland, Yong, O'Connor, Hyland, & Thompson, 2010) , IPARS = Intimate Partner Aggression-related Shame Scale (Weiss, Duke, Overstreet, Swan, & Sullivan, 2016), =ISS Internalized Shame Scale (Cook, 1994), IS = Internalized shame perceived by people who inject drugs adapted from Herek and Capitanio (1993)., MCMI = Millon Clinical Multiaxial Inventory (Millon, 1987; Millon, 1994), NEO-PI-R = Neuroticism-Extraversion Openness Personality Inventory Revised (de Fruyt, McCrae, Szirmak & Nagy, 2004), NIDA = National Institute on Drug Abuse, OBCS-BS = Objectified Body Consciousness Scale, body shame subscale (McKinley & Hyde, 1996), PAI = Personality Assessment Inventory for alcohol and drug problems (Morey, 1991), PANAS = Positive and Negative Affect Scales (Watson, Clark, & Tellegen, 1988), PAUM = Problems with Alcohol Use Measure (Rhea, Nagoshi, & Wilson, 1993), PFQ-2 = Personal Feelings Questionnaire–2 (Harder & Zalma, 1990) , PWID = People who inject drugs, RAPI = Rutgers Alcohol Problem Index (White & Labouvie, 1989) , RCT = Randomized Controlled Trial, SI = Shame Inventory (Razvi, 2010), SMAST = Self-Administered Short Michigan Alcoholism Screening Test, SSGS = State Shame and Guilt Scale (Marschall, Sanftner, & Tangney, 1994) , SUD = Substance Use Disorder, TAS = Total Anxiety Scale (Gottschalk & Gleser, 1969), TCU-CRTF = Texas Christian University Correctional: Residential Treatment Form, Initial Assessment (Simpson & Knight, 1998) , TLFB = Timeline Followback (Sobell & Sobell, 1996), TOSCA = Test of Self-Conscious Affect (Tangney, Dearing, Wagner, & Gramzow, 2000) , TOSCA-C = Test of Self-Conscious Affect for Children (Tangney, Wagner, Burggraf, Gramzow, & Fletcher, 1990), TOSCA-SD = Test of Self-Conscious Affect for socially deviant and incarcerated groups (Hanson & Tangney, 1996), YAACQ = Young Adult Alcohol Consequences Questionnaire (Read, Kahler, Strong, & Colder, 2006), YSQ-L3 = Young Schema Questionnaire—Long Form, Third Edition's, Defectiveness/Shame subscale (Young and Brown 2003), YSQ-S3 = Young Schema Questionnaire—Short Form, Third Edition's, Defectiveness/Shame subscale (Young, 1994).

Appendix F

Additional References

American Psychiatric Association. (2000). Diagnostic and statistical manual of mental disorders:

DSM-IV-TR. Washington, DC: Author.

Babor, T. F., Higgins-Biddle, J. C., Saunders, J. B., Monteiro, M. G., & Organization, W. H.

(2001). *AUDIT: The Alcohol Use Disorders Identification Test: Guidelines for use in

primary care* (2nd ed.). Geneva: World Health Organization.

Borland, R., Yong, H.-H., O'Connor, R., Hyland, A., & Thompson, M. (2010). The reliability

and predictive validity of the Heaviness of Smoking Index and its two components:

Findings from the International Tobacco Control Four Country study. *Nicotine &

Tobacco Research, 12*(suppl_1), S45-S50.

Brem, M. J., Shorey, R. C., Anderson, S., & Stuart, G. L. (2017). Dispositional mindfulness,

shame, and compulsive sexual behaviors among men in residential treatment for

substance use disorders. *Mindfulness*, *8*(6), 1552-1558.

Collins, R. L., Parks, G. A., & Marlatt, G. A. (1985). Social determinants of alcohol

consumption: The effects of social interaction and model status on the self-administration

of alcohol. *J Consult Clin Psychol, 53*(2), 189-200.

Dimeff, L. A. (1999). *Brief alcohol screening and intervention for college students (BASICS): A

harm reduction approach*. New York, NY:Guilford Press.

Elison, J., Lennon, R., & Pulos, S. (2006). Investigating the compass of shame: The development

of the Compass of Shame Scale. *Social Behavior and Personality: An International

Journal, 34*(3), 221-238.

Etter, J.-F. (2005). A comparison of the content-, construct-and predictive validity of the

    cigarette dependence scale and the Fagerström test for nicotine dependence. *Drug &*

    Alcohol Dependence, 77(3), 259-268.

Fagerström, K., & Furberg, H. (2008). A comparison of the Fagerström Test for Nicotine

    Dependence and smoking prevalence across countries. *Addiction, 103*(5), 841-845.

Fruyt, F. D., McCrae, R. R., Szirmák, Z., & Nagy, J. (2004). The five-factor personality

    inventory as a measure of the five-factor model: Belgian, American, and Hungarian

    comparisons with the NEO-PI-R. *Assessment, 11*(3), 207-215.

Gottschalk, L. A., & Gleser, G. C. (1969). *The measurement of psychological states through the*

    content analysis of verbal behavior.London, England: Univ of California Press.

Greene, D. C., & Britton, P. J. (2012). Lesbian, gay, bisexual, and transgender smokers:

    Correlations with external health control, health expectations, and shame-focused coping

    strategies. *Journal of LGBT Issues in Counseling*, 6(3), 202-228.

Hanson, RK.; Tangney, JP. The Test of Self-Conscious Affect—Socially Deviant Populations

    (TOSCA-SD). Corrections Research, Department of the Solicitor General of Canada;

    Ottawa: 1996. Harder, D. H., & Zalma, A. (1990). Two promising shame and guilt scales:

    A construct validity comparison. *Journal of Personality Assessment, 55*(3-4), 729-745.

Heatherton, T. F., Kozlowski, L. T., Frecker, R. C., & Fagerstrom, K. O. (1991). The Fagerström

    test for nicotine dependence: A revision of the Fagerstrom Tolerance Questionnaire.

    Addiction, 86(9), 1119-1127.

Herek, G. M., & Capitanio, J. P. (1993). Public reactions to AIDS in the United States: Asecond

    decade of stigma. *American Journal of Public Health, 83*(4), 574-577.

Ianni, P. A., Hart, K. E., Hibbard, S., & Carroll, M. (2010). The association between self-

forgiveness and alcohol misuse depends on the severity of drinker's shame: Toward a buffering model. *Addictive Disorders & Their Treatment*, *9*(3), 106-111.

Kahler, C. W., Strong, D. R., & Read, J. P. (2005). Toward efficient and comprehensive measurement of the alcohol problems continuum in college students: The Brief Young Adult Alcohol Consequences Questionnaire. *Alcoholism: Clinical and Experimental Research, 29*(7), 1180-1189.

Li, L., Tuan, N. A., Liang, L. J., Lin, C., Farmer, S. C., & Flore, M. (2013). Mental health and family relations among people who inject drugs and their family members in Vietnam. *International Journal of Drug Policy*, *24*(6), 545-549.

Marschall, D., Sanftner, J., & Tangney, J. P. (1994). *The State Shame and Guilt Scale*. Fairfax, VA*:* George Mason University.

McKinley, N. M., & Hyde, J. S. (1996). The objectified body consciousness scale development and validation. *Psychology of Women Quarterly, 20*(2), 181-215.

McLellan, A. T., Kushner, H., Metzger, D., Peters, R., Smith, I., Grissom, G., . . . Argeriou, M. (1992). The fifth edition of the Addiction Severity Index. *Journal of Substance Abuse Treatment*, *9*(3), 199-213.

Millon, T. (1987). *Millon Clinical Multiaxial Inventory II: Manual for the MCMI-II*. Minneapolis: National Computer Systems.

Millon, T. (1994). *Millon Clinical Multiaxial Inventory III: Manual*. Minneapolis: National Computer Systems.Morey, L. C., & Staff, P. (1991). Personality assessment inventory. *Personality Assessment*, *2*, 181-228.

Patock-Peckham, J. A., Canning, J. R., & Leeman, R. F. (2018). Shame is bad and guilt is good:

An examination of the impaired control over drinking pathway to alcohol use and related

problems. *Personality and Individual Differences*, *121*, 62-66.

Prosek, E. A., Giordano, A. L., Holm, J. M., Bevly, C. M., Sender, K. M., Ramsey, Z. B., &

Abernathy, M. R. (2017). Experiencing shame: Collegiate alcohol abuse, religiosity, and

spirituality. *Journal of College Counseling*, *20*(2), 126-138.

Read, J. P., Kahler, C. W., Strong, D. R., & Colder, C. R. (2006). Development and preliminary

validation of the young adult alcohol consequences questionnaire. *Journal of Studies on

Alcohol, 67*(1), 169-177.

Reid, R. C., Carpenter, B. N., & Hook, J. N. (2016). Investigating correlates of hypersexual

behavior in religious patients. *Sexual Addiction & Compulsivity*, *23*(2-3), 296-312.

Rhea, S. A., Nagoshi, C. T., & Wilson, J. R. (1993). Reliability of sibling reports on parental

drinking behaviors. *Journal of Studies on Alcohol*, *54*(1), 80-84.

Richardson, C. G., & Ratner, P. A. (2005). A confirmatory factor analysis of the Fagerstrom Test

for Nicotine Dependence. *Addictive Behaviors*, *30*(4), 697-709.

Rizvi, S. L. (2010). Development and preliminary validation of a new measure to assess shame:

The Shame Inventory. *Journal of Psychopathology and Behavioral Assessment*, *32*(3),

438-447.

Rodriguez, L. M., Young, C. M., Neighbors, C., Campbell, M. T., & Lu, Q. (2015). Evaluating

guilt and shame in an expressive writing alcohol intervention. *Alcohol*, *49*(5), 491-498.

Selzer, M. L., Vinokur, A., & van Rooijen, L. (1975). A self-administered short Michigan

alcoholism screening test (SMAST). *Journal of Studies on Alcohol*, *36*(1), 117-126.

Simpson, D. D., & Knight, K. (1998). *TCU data collection forms for correctional residential*

treatment. Texas Christian University Institute of Behavioral Research Web site:

www.ibr.tcu.edu

Simons, R. M., Sistad, R. E., Simons, J. S., & Hansen, J. (2018). The role of distress tolerance in

the relationship between cognitive schemas and alcohol problems among college

students. *Addictive Behaviors*, *78*, 1-8.

Skinner, H. A. (1982). The drug abuse screening test. *Addictive Behaviors, 7*(4), 363-371.

Sobell, L. C.; Sobell, M. B (1996). T*imeline FollowBack user's guide: A calendar method for

assessing alcohol and drug use*. Toronto: Addiction Research Foundation.Stuart, G. L.,

Moore, T. M., Kahler, C. W., & Ramsey, S. E. (2003). Substance abuse and relationship

violence among men court-referred to batterers' intervention programs. *Substance Abuse,

24*(2), 107-122.

Stuart, G. L., Moore, T. M., Ramsey, S. E., & Kahler, C. W. (2004). Hazardous drinking and

relationship violence perpetration and victimization in women arrested for domestic

violence. *Journal of Studies on Alcohol*, *65*(1), 46-53.Tangney, J. P., Wagner, P.,

Burggraf, S., Gramzow, R., & Fletcher, C. (1990). *The Test of Self-Conscious Affect for

Children (TOSCA-C).* Fairfax, VA: George Mason University.

Turner, J. E. (1998). An investigation of shame reactions, motivation, and achievement in a

difficult college course. *Dissertation Abstracts International Section A: Humanities and

Social Sciences, 59*(6-A), 1911.Watson, D., Clark, L. A., & Tellegen, A. (1988).

Development and validation of brief measures of positive and negative affect: The

PANAS scales. *Journal of Personality and Social Psychology*, *54*(6), 1063-1070.

Weiss, N. H., Duke, A. A., Overstreet, N. M., Swan, S. C., & Sullivan, T. P. (2016). Intimate

    partner aggression-related shame and posttraumatic stress disorder symptoms: The

    moderating role of substance use problems. *Aggressive Behavior*, *42*(5), 427-440.

White, H. R., & Labouvie, E. W. (1989). Towards the assessment of adolescent problem

    drinking. *Journal of Studies on Alcohol*, *50*(1), 30-37.

Winkeljohn Black, S., Pössel, P., & Dietz, A. (2016). Understanding student drinking patterns:

    Does shame proneness matter?. *Journal of Drug Education*, *46*(3-4), 82-95.

Young, J. E., & Brown, G. (2003). *Young schema questionnaire*. NY: Cognitive Therapy Center

    of New York.Young, J. E. (2005). *Young Schema Questionnaire – Short Form 3 (YSQ-

    S3)*. New York, NY: Cognitive Therapy Center.

Supplementary Materials

Detailed Method

Throughout the systematic review process, we followed a protocol that specified study details, including research objectives, inclusion and exclusion criteria, method of article retrieval and method of data extraction.

Eligibility criteria included: a) original research published in a peer-reviewed journal, b) quantitative studies (including, but not limited to, intervention studies) c) assesses shame in relation to substance consumption or substance use-related problems/dependence. We included studies examining people of all ages, with or without substance use disorders. Exclusion criteria included: a) dissertations, b) qualitative or case studies, c) not reported in the English language, d) substance use related to self not measured (e.g. measured substance use of parents of participants). Additionally, we decided to exclude studies that investigated anabolic steroid use (e.g. Parent & Moradi, 2011), as this type of drug does not have an addictive component, and thus remains qualitatively different than the other substances under review.

PubMed, PsycInfo and Web of Science were searched using the term 'shame' in pairwise combination with *substances*, *drink*, *drug*, *drugs*, *alcohol*, *illicit*, *smoke*, *smoking*, and *nicotine*. An example search in PubMed[2] is provided in the footer[i]. Additionally, we searched the authors' personal files to make sure that all relevant material has been captured.

Team members retrieved a total of 2190 titles/abstracts. After combining all titles/abstracts onto a single spreadsheet, an author used the excel duplicate function to exclude

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[2] In the PubMed search bar, we typed: '(Shame AND Substance) OR (Shame AND Substances) OR (Shame AND Drink) OR (Shame AND Drug) OR (Shame AND Drugs) OR (Shame AND Alcohol) OR (Shame AND Illicit) OR (Shame AND Smoke) OR (Shame AND Smoking) OR (Shame AND Nicotine)'. Then, after pressing enter, we clicked "show additional filters" and selected 'language.' Under the language heading, we selected English as a filter. We used no other filters or constraints.

263 articles, and then visual inspection to exclude another 500 duplicates. Next, one of the

authors examined article titles and excluded any articles that clearly did not meet inclusion

criteria, such as books/book chapters, letters to/from authors, book/film/movie reviews,

conference presentations, articles detailing corrections to previously published articles, and

solely qualitative studies. This preliminary screening procedure resulted in the exclusion of

another 766 cases, leaving a total of 661 for the abstract review. Two raters independently

reviewed abstracts. Papers were excluded if both raters agreed it should be excluded ($n = 316$); if

one or both raters thought the paper should be included, the paper was included in the full-paper

review ($n = 345$). Two raters independently reviewed articles for the full paper review.

Disagreements between reviewers were resolved by a third rater. Papers were excluded if they

did not meet study criteria. A set of 90 papers were selected for the data extraction process.

We developed a data extraction sheet specific to the studies under review before

beginning data extraction. One author extracted data and another checked the extracted data.

Disagreements were resolved by discussion. If information relevant to the review was missing,

we contacted study authors for additional information.

For each article, we retrieved the following information for each article: sample size,

participant information (sample type, race, gender, and age), study type (e.g. cross-sectional with

comparison groups, longitudinal), substance type, shame measure(s), substance use outcome

measure(s), other outcome measure(s), results and analyses relevant to the relationship between

shame and substance use, article limitations, a subjective quality rating ranging from 1 (low) to 5

(high), and a brief narrative summary of key results. Through this process, the authors identified

a further 303 studies that did not investigate the association between shame and substance use, or

investigated a construct related to shame, rather than shame per se, leaving a total of 42 studies

(54 samples) for the qualitative synthesis.

Studies were assessed for methodological quality of methods via two methods. First, they

were rated from one to five as discussed above. Furthermore, overall study quality was

considered in how results were described and discussed in the qualitative section of the paper.

Only one hypothesis relating to methodological factors that was explored quantitatively—

whether experiential versus proneness measures of shame would moderate results in the meta-

analysis.

Detailed Meta-Analytic Results of the Association Between TOSCA Shame Measures and

Substance Consumption

We examined whether the type of TOSCA measure affected the relationship (or lack thereof) between shame and substance consumption. Because our random effects models cannot include studies in which both TOSCA guilt-free-shame and TOSCA unpartialled shame were assessed in the same study, we ran a series of models, described below, as opposed to moderation analyses.

First, we ran analyses that included either TOSCA guilt-free-shame scores or TOSCA unpartialled scores along with all available other data. In the analysis including TOSCA guilt-free-shame scores, we needed to exclude two studies that only assessed shame with the TOSCA shame unpartialled measure (Dearing et al., 2013; Patock-Peckham, Canning & Leeman, 2018). The mean weighted effect size for the association between shame and substance consumption across the 12 studies that included TOSCA guilt-free-shame measures was $r = .04$ (95% CI = [-.01, .08]). The mean association between shame and substance consumption was not significantly different than zero ($z = 1.66$, $p = .116$). Heterogeneity for the association between shame and substance consumption was nonsignificant based on the Q_w statistic, $Q(11) = 14.23$, $p = .221$. The mean weighted effect size for the association between shame and substance consumption across the 14 studies including TOSCA unpartialled shame measures was $r = .00$ (95% CI = [-.06, .06]). The mean association between shame and substance consumption was not significantly different than zero ($z = .01$, $p = .995$). Heterogeneity for the association between shame and substance consumption was nonsignificant based on the Q_w statistic, $Q(13) = 15.81$, $p = .259$.

Next, we ran analyses using only the four studies (Dearing et al., 2005, Study 3; Stuewig et al., 2009; Tangney et al., 2011; Treeby et al., 2017) that included measures of both TOSCA guilt-free-shame and TOSCA unpartialled shame. We found no significant association between shame, assessed with the TOSCA guilt-free-shame measure, and substance consumption. The mean weighted effect size for the association between shame and substance consumption across these 4 studies was $r = .01$ (95% CI = [-.04, .06]). The mean association between shame and substance consumption was not significantly different than zero ($z = .47$, $p = .640$). Heterogeneity for the association between shame and substance consumption was nonsignificant based on the Q_w statistic, $Q(3) = 1.11$, $p = .776$. Similarly, the mean weighted effect size for the association between shame, assessed with the TOSCA unpartialled shame measure, and substance consumption across these 4 studies was $r = .00$ (95% CI = [-.05, .06]). The mean association between shame and substance consumption was not significantly different than zero ($z = .16$, $p = .870$). Heterogeneity for the association between shame and substance consumption was nonsignificant based on the Q_w statistic, $Q(3) = 1.75$, $p = .627$.

Substance Use Related Problems

We conducted an additional set of analyses that examined whether the type of TOSCA measure affected the relationship between shame and substance use-related problems. We first ran an analysis that included TOSCA guilt-free-shame scores along with all other measures, and excluded the two studies that only assessed shame with TOSCA unpartialled shame (Dearing et al., 2013; Patock-Peckham et al., 2018). The mean weighted effect size for the association between shame and substance use-related problems across these 16 studies was $r = .17$ (95% CI = [.13, .20]). This association was significantly different than zero ($z = 9.52$, $p < .001$), and heterogeneity was nonsignificant based on the Q_w statistic, $Q(15) = 16.00$, $p = .382$. The fail-safe

N for the association between shame and substance use-related problems was relatively high (*N* = 711), suggesting that this association remained stable and tolerant to null results. Next, we ran an analysis that included TOSCA unpartialled shame scores along with all other measures. The mean weighted effect size for the association between shame and substance use-related problems across these 18 studies was *r* = .14 (95% CI = [.11, .18]). This association was significantly different than zero (*z* = 7.65, *p* < .001), and heterogeneity for the association was nonsignificant based on the Q$_w$ statistic, *Q*(17) = 19.23, *p* = .316. The fail-safe *N* for the association between shame and substance-use consumption was again relatively high (*N* = 649), indicating that this association remained stable and tolerant to null results. These results suggest that, regardless of whether TOSCA guilt-free-shame scores, or TOSCA unpartialled shame scores were included in the average effect sizes, the association between shame and substance use-related problems remained significant. Yet, this association was greater when TOSCA guilt-free-shame was included (*r* = .17) than when TOSCA unpartialled shame was included (*r* = .14).

Next, we analyzed the association between shame and substance use-related problems amongst the six samples that assessed both TOSCA guilt-free shame and TOSCA unpartialled shame (Dearing et al., 2005, Studies 1-3; Hequembourg & Dearing, 2013; Tangney et al., 2011, Treeby & Bruno, 2012). As expected, we found a significant association between both TOSCA measures and substance use-related problems. The mean weighted effect size for the association between TOSCA guilt-free shame and substance use related problems was *r* = .15, 95% CI = [.11, .19]; *z* = .6.63, *p* < .001; failsafe *n* = 96. The mean weighted effect size for the association between TOSCA unpartialled shame and substance use-related problems was *r* = .10; 95% CI = [.06, .15]; *z* = 4.58, *p* < .001; failsafe *n* = 40. Heterogeneity was nonsignificant for both analyses, *Q$_w$*(5) = 4.11, *p* = .534 and *Q$_w$*(5) = 4.05, *p* = .542, respectively. These results suggest that studies

that use TOSCA unpartialled shame scores, as opposed to TOSCA guilt-free-shame scores, may

result in somewhat less of an association between shame and substance use-related problems

compared to TOSCA partialled scores.

Detailed Meta-Analytic Results of the Association Between Shame and Different Types of Substances

Of the samples in the meta-analysis on the associations between shame and substance use, nine only assessed the association between shame and substance use, one only assessed general drug use (including alcohol use), one assessed needle use, another assessed cigarette use, and another two separately assessed polydrug use, alcohol use, cocaine use and marijuana use. Thus, these results are most representative of the association between shame and substance use consumption as a whole. We did not have sufficient numbers of samples for the different types of substance to include substance type as a moderating variable; however, we qualitatively inspected the data in order to investigate whether substance type significantly altered this association. For the study assessing the relationship between shame and cigarette use (Greene & Britton, 2012), the researchers found a significant negative association between avoidant shame coping and smoking ($r = -.11$, $p < .05$); no significant association between attack-self shame coping and smoking ($r = -.05$, $p > .05$). For the study assessing shame and needle use (Stuewig et al., 2009), the researchers found no significant association between these variables ($r = -.03$, $p > .051$). For one study separately assessing alcohol, polydrug, cocaine and marijuana use (Dearing et al., 2005; Sample 3): guilt-free shame was related to more frequent cocaine use and polydrug use, but not with more frequent alcohol-use or marijuana-use frequency. For the other study separately assessing these same types of substances (Tangney et al., 2011), shame was not correlated with frequency of use for any substance type. This limited data suggests that the overall association between shame and substance use did not appear to significantly differ depending upon the type of substance use. However, given the small number of studies assessing a substance other than alcohol, this tentative conclusion results further investigation.

Of the samples in this meta-analysis of the association between shame and substance use-related problems, ten only assessed alcohol use, five assessed general drug use separately from alcohol use, two separately assessed alcohol, marijuana, opiate and cocaine use, and one assessed injected drugs, another. Thus, these results are most representative of the association between shame and substance use-related problems. We did not have sufficient numbers of samples for the different types of substance to include substance type as a moderating variable; however, we qualitatively inspected the data in order to investigate whether substance type significantly altered this association. All studies separately assessing alcohol use and general drug use found similar associations regardless of substance type. Amongst injection drug users (Li et al., 2013), internalized shame was associated with higher scores on the addiction severity index ($r = .32$, $p < .05$). For one separately assessing alcohol, marijuana, opiate and cocaine use (Hequembourg & Dearing, 2013), shame-proneness was associated with most substance use-related problem outcome measures (alcohol severity, severe marijuana dependence, opiate dependence, cocaine dependence, and severe cocaine dependence), but was neither significantly related to marijuana dependence nor severe opiate dependence. For the other study separately assessing these same types of substances (Tangney et al., 2011), shame-proneness was significantly associated with most substance use-related problem outcome measures (alcohol problems, alcohol dependence, drug problems, marijuana dependence), but was neither significantly associated with cocaine dependence nor opiate dependence. Thus, this limited data suggests that the overall association between shame and substance use-related problems did not significantly differ depending upon the type of substance. Given the small number of studies separately assessing substances other than alcohol use, this area warrants further research.