Routledge
Taylor & Francis Group

EDITOR'S CHOICE PAPER

🔓 OPEN ACCESS   Check for updates

Daily support seeking as coping strategy in dual-smoker couples attempting to quit

Philipp Schwaninger 📧, Janina Lüscher 📧, Corina Berli 📧 and Urte Scholz 📧

Department of Psychology, University of Zurich, Zurich, Switzerland

ABSTRACT

Objective: Smoking cessation is a stressful event and lapses are frequent. The dynamic model of relapse has been criticized for not integrating interpersonal factors as phasic influences. Seeking social support, as a coping strategy to deal with cravings, may help to refrain from smoking.

Design: Overall, 83 heterosexual dual-smoker couples reported on their craving, the extent of seeking social support from one's partner regarding smoking cessation, and their number of cigarettes smoked in smartphone-based end-of-day diaries, from a joint self-set quit date on across 22 consecutive days.

Main outcome measure: Number of cigarettes smoked.

Results: Multilevel analyses indicated that on days with higher-than-average levels of craving, male and female smokers reported more cigarettes smoked. Higher-than-usual support seeking was related to fewer cigarettes smoked that same day. For women only, we found a within-person interaction between craving and support seeking on smoking. On days with higher-than-average support-seeking, the effect of craving on smoking was attenuated.

Conclusion: Findings confirm the relevance of interpersonal processes in the relapse process, such as support seeking as coping behavior. Further, as a 'first act' in initiating supportive interactions, support seeking is an important piece in the social support process and a promising target for interventions.

Introduction

Smoking remains a major risk factor for different non-communicable diseases and is one of the leading causes of preventable deaths worldwide (Stanaway et al., 2018). Despite the knowledge about these negative health consequences, in Switzerland, every fourth (27.1%) person aged 15 and older smoked in 2017 (Federal Statistical

CONTACT Philipp Schwaninger ✉ philipp.schwaninger@psychologie.uzh.ch 📄 Department of Psychology, Applied Social and Health Psychology, University of Zurich, Binzmuehlestrasse 14 / Box 14, Zürich8050, Switzerland

Office, 2018). This proportion has changed only marginally over the last ten years (Federal Statistical Office, 2018). Repeated attempts to quit smoking and high relapse rates early after a quit attempt show the major challenge of initiating a period of abstinence, which seems to be the main problem in quitting smoking (Hughes et al., 2004). The prevention of relapse is thus crucial for achieving smoking abstinence over time (Scharf et al., 2016; Witkiewitz & Marlatt, 2004).

In the reformulation of Marlatt's relapse prevention model (Marlatt & Gordon, 1985), relapse is conceptualized as a multifactorial and dynamic process (dynamic model of relapse; DMR; Witkiewitz & Marlatt, 2004). Studies have shown that quit attempts are characterized by high fluctuations i.e. multiple transitions between smoking and abstinence over a short period of time (Hughes et al., 2013; Peters & Hughes, 2009). Considering relapse as an escalation of smoking behavior (vs. lapses as limited episodes of smoking; Shiffman, 2005) every cigarette not smoked should be important to achieve abstinence. Indeed, reducing the daily cigarettes smoked seems to be a precursor for successful smoking cessation (Klemperer & Hughes, 2016; Klemperer et al., 2019).

According to the DMR, single substance use events are influenced by proximal factors or phasic processes, including cognitive, affective and physical states as well as coping (Witkiewitz & Marlatt, 2004). For instance, successful coping with high-risk situations (e.g., cravings) during a quit attempt, as an example for a phasic process, should reduce the risk of smoking (Hendershot et al., 2011). A common way of coping is support seeking that appears in any comprehensive system of coping under different labels such as social support, proximity seeking, and help seeking (Kraaij & Garnefski, 2019; Skinner et al., 2003). In this regard, the DMR has been criticized for omitting interpersonal factors as phasic processes (Stanton, 2005), such as the reaching out to people to elicit and reinforce social support resources (Hunter-Reel et al., 2009). Although, the encouragement of smokers to talk about the quitting process has been recommended by the clinical practice guideline 'Treating Tobacco Use and Dependence' (Fiore, 2000), there is lack of research testing support seeking as a specific coping behavior in the smoking cessation context. The present study takes an interpersonal view to examine the role of support seeking at the within-person level to withstand cravings and to not smoke during a quit attempt in dual-smoker couples' everyday life.

Craving

Craving is often defined as the subjective experience of an intense urge to use a substance or perform a rewarding behavior (Auriacombe et al., 2018). Thus, craving is generally seen as a drug-acquisitive state that motivates substance use (Sayette, 2016). Abstinent smokers may experience fluctuations in craving long after quitting, due to the exposure to situational cues associated with smoking (cue-induced cravings; Scharf et al., 2016). Systematic reviews and a recent experimental and ecological momentary assessment (EMA) study confirm the strong predictive effect of craving on subsequent substance use (Motschman et al., 2018; Serre et al., 2015, 2018; Wray et al., 2013). These findings are in accordance with the DMR and other models of addiction that emphasize craving as a high-risk situation driving renewed substance use (Auriacombe et al., 2018; Witkiewitz & Marlatt, 2004). The DMR points to the coping response of an individual to such high-risk situations, but neglects interpersonal factors as phasic

processes (Stanton, 2005). Coping can be defined as "efforts to prevent or diminish threat, harm, and loss, or to reduce associated distress" (Carver & Connor-Smith, 2010, p. 685), and consists of cognitive and behavioral strategies to deal with external or internal demands and challenges (Kraaij & Garnefski, 2019; O'Connell et al., 2006). In the context of smoking cessation, studies have shown that the risk of smoking is decreased by engaging in coping strategies, such as movement/exercise, encouraging self-talk or adopting stimulus control (Brodbeck et al., 2013; O'Connell et al., 2006, 2007).

Support seeking as coping strategy

Social support is defined as "a social network's provision of psychological and material resources intended to benefit an individual's ability to cope with stress" (Cohen, 2004, p. 676). That corresponds to the conceptualization of social support as coping assistance: the engagement of others in an individual's coping efforts through emotional help (e.g., demonstrations of caring, valuing and understanding) and active coping assistance (e.g., advice, informational and instrumental support; Thoits, 2011).

Little is known about support seeking as a 'first act' in initiating supportive interactions (MacGeorge et al., 2011). Support seeking is defined as "intentional communicative activity with the aim of eliciting supportive actions from others" (MacGeorge et al., 2011, p. 330), and can be classified as behavioral coping strategy (Kraaij & Garnefski, 2019). According to the sensitive interaction systems theory (SIST), support seeking strategies are classified on the dimensions of verbal or nonverbal (e.g., talking about the stressor vs. showing distress through crying) and direct or indirect (e.g., explicit requests for help vs. hinting that a problem exists; Barbee & Cunningham, 1995). Dependent on the goal of support seeking (e.g., receiving emotional support or instrumental help) or the way individuals seek support (e.g., direct vs. indirect), it could be categorized either way as emotional- vs. problem-focused or engagement vs. disengagement coping (Carver & Connor-Smith, 2010). A smoker may directly seek support from his/her spouse to cope with cravings while quitting smoking. Apart from the possibility to receive adequate support regarding stressful cravings, direct support seeking likely reduces psychological distress and harmful physiological arousal through venting by talking out and through the sheer comforting presence of another person (simply 'being there'; Thoits, 2011). Support seeking as coping with craving experiences should theoretically increase the ability to abstain, by moderating the relation between craving and smoking (Westmaas et al., 2010; Wills & Shiffman, 1985; Witkiewitz & Marlatt, 2004). Additionally, talking or asking for help in craving situations may take time, being an alternative behavior to smoking. Thus, support seeking as behavioral coping strategy might have beneficial effects itself and decrease the likelihood of smoking behavior during smoking cessation apart from stressful craving experiences. So far, research on support seeking has focused mainly on the prediction of support seeking, the sources of support, and the types of support sought, and rarely on the outcomes of support seeking (MacGeorge et al., 2011).

In daily life, health behavior change often occurs in the context of close relationships and evidence points to the strong interdependence of behavior change, such as smoking cessation, within couples (Homish & Leonard, 2005; Jackson et al., 2015). Thereby spouses are important sources to be turned to for social support (Lewis et al.,

2006). The present study involves dual-smoker couples engaging in a joint quit attempt, likely seeking support from each other. Social support is a dynamic process involving a two-sided interaction (Schwarzer & Knoll, 2007) and as such requires that information provided from both sides of a relationship be taken into account (Lewis et al., 2006). The present study applies this dyadic approach, examining the support seeking from one couple member, while controlling for the support seeking of the other couple member. This approach also allows to exploratively examine gender differences for these processes within couples.

Within- and between-person associations

The DMR and many other addiction theories posit hypotheses of what will happen within a given individual (within-person processes), instead of between individuals (between-person differences). For example, the DMR posits that when an individual experiences craving to smoke a cigarette, this person is more likely to smoke (within-person process). The between-person approach would give us information about between-person differences, for example whether individuals with higher craving in general smoke more cigarettes than individuals with lower craving (Curran & Bauer, 2011). The associations at these two levels do not necessarily have to be the same and can even operate in opposite directions (Curran & Bauer, 2011). Testing the proposed within-person associations of the DMR over time requires the assessment of intraindividual fluctuations with repeated measures using an intensive longitudinal study design (Curran & Bauer, 2011). The present study investigated associations between daily craving, daily support seeking and smoking at the within-person level while controlling for the effects at the between-person level applying multilevel modeling.

Aim of the present research

This daily diary study examined within-person associations between daily craving, daily support seeking, and daily smoking behavior in dual-smoker couples after a joint self-set quit attempt. These individual processes were investigated in the context of heterosexual couples.

In line with the theoretical background, we hypothesized that on days with higher craving than usual, male and female smokers would report having smoked more cigarettes (hypothesis 1), and that on days with more support seeking than usual, male and female smokers would report having smoked fewer cigarettes (hypothesis 2). Additionally, we hypothesized that support seeking as behavioral coping strategy would moderate the positive association between craving and smoking within a given day: On days with more support seeking than usual, the positive association between daily craving and smoking would be alleviated for both partners of the dyads (hypothesis 3). Potential gender differences between female and male partners of the dyads were exploratively tested.

Method

Design and participants

The data of the present study are from a larger project with a prospective longitudinal design investigating individual self-regulation and dyadic exchanges during a joint

self-set quit attempt in dual smoker couples. The project was funded by the Swiss National Science Foundation (PP00P1_133632/1) and was approved by the ethics committee of the University of Bern in Switzerland (2011-11-14409) and run from 2012 to 2014. A detailed description of the design, recruitment strategies, inclusion criteria, and sample characteristics, can be found elsewhere (Lüscher & Scholz, 2017; Lüscher et al., 2017).

The sample consisted of 83 heterosexual dual-smoker couples living in a committed relationship for at least one year ($M = 12.68$, $SD = 12.79$ years) and cohabitating for at least 6 months ($M = 11.00$, $SD = 13.00$ years). Both partners smoked at least one cigarette per day and intended to quit smoking on a joint self-set quit date during the study period. At the joint self-set quit date, the intention to quit smoking ($M = 5.2$, $SD = 1.0$, range = 1-6), and the desire that one's partner quit smoking ($M = 4.0$, $SD = 1.8$, range = 1–6) was high. Exclusion criteria were insufficient knowledge of the german language, pregnancy, working in 24-hour shifts, and participation in a professional smoking cessation program. The mean age for male smokers was 40.7 years ($SD = 14.5$, range = 20–71) and for female smokers 38.5 years ($SD = 14.6$, range = 19–68). Most participants reported having completed higher education (women: 20.5%; men: 22.9%) and were currently employed (women: 61.4%; men: 71.8%). Participating couples were invited to the lab where they provided written informed consent and announced their joint self-set quit date. Ten days before the quit date and 21 days afterwards (in total 32 consecutive days) couples completed daily evening diaries using study provided smartphones (one for each partner). Couples were instructed to fill out the daily survey each night within one hour of going to bed separately from each other. This study focused on the quit day and the following 21 days only, because we were interested in the relapse process. Support seeking as behavioral coping strategy is assumed to be particularly important during the initiation of smoking abstinence and urgently needed after the quit attempt for preventing smoking behavior (Westmaas et al., 2010; Witkiewitz & Marlatt, 2004). Dual-smoker couples received CHF 100 (= 97 USD) for completing the diary phase. The diary completion rates were high ($n = 3031$ [83.0%] of 3652 possible diary days).

Measures

During the 22 consecutive days, both partners of dual-smoker couples reported on their daily experiences. All items were administered in German. The following item examples have been translated into English. Table 1 gives an overview of the descriptive statistics of the variables of interest.

Daily number of cigarettes smoked was assessed with the item 'Did you smoke today (including only one puff)?'. Response format was no (0) or yes (1). If the response was yes, they were asked to report how many cigarettes they had smoked (Heatherton et al., 1991). Otherwise, the daily number of cigarettes smoked was coded as 0.

Daily craving was assessed with the item 'How strong was your craving for a cigarette today?' adapted from Müller et al. (2001). Response format ranged from (1) 'not at all present today' to (6) 'extremely strong present today'. With this assessment, we are following the recommendation of the Society for Research on Nicotine and Tobacco work group on the assessment of craving (Shiffman et al., 2004) to use single-item measures of craving.

Table 1. Available data, means, standard deviations, ranges, intraclass correlations (ICC), reliabilities and correlations (between-person level) of main variables for N = 83 dual-smoker couples for the quit date and the 21 days after.

	n	M	SD	Range	ICC	R_{KF}	R_C	1.	2.
1. Daily number of cigarettes smoked	3026	4.27	6.08	0-40	0.82	–	–	.	
2. Craving	3652	3.76	0.80	1-6	0.47	–	–	.48***	.
3. Support seeking	3652	1.93	0.83	1-6	0.51	.98	.82	.02	.05

Note. n = number of available diary days; M = Mean (between-person); SD = Standard deviation (between-person); ICC = Intraclass correlations; the intraclass correlation stands for the amount of between-person variance in relation to total variance; R_{KF} = between –person reliability; R_C = within-person reliability; ***$p < .001$; below diagonal are correlations at the between level.

Daily support seeking was assessed with two items with the preceding instruction: 'Support can be emotional (e.g., listening, comforting) or can include practical help (e.g., doing something to help the other person, such as taking on household chores)'. Then both partners rated the two items, one on emotional and one on practical support: 'Today, I asked my partner for emotional support regarding my quit attempt' and 'Today, I asked my partner for practical support regarding my quit attempt' adapted from Bolger et al. (2000). Response format ranged from (1) 'definitely not true' to (6) 'completely true'. In the present study, we used a mean score of emotional and practical support seeking, due to the high correlation of seeking emotional and practical support ($r = .96$, $p < .001$). Within- and between-person reliability scores are reported in Table 1 and demonstrated satisfactory reliabilities.

Data analysis

To test our hypotheses, we used multilevel modelling to account for the hierarchical data structure, and the interdependence among the couples (i.e., individual scores were nested within dyads), following recommendations by Bolger and Laurenceau (2013). Due to the dyadic diary data with distinguishable dyad members, we ordered the data based on the factor gender (Kenny et al., 2006). Thus, we were able to analyze the effect of one partner, while controlling for the effect of the other partner (Kenny et al., 2006). The multilevel approach allows investigating associations between predictors and the outcome variable at both the within-person (level 1) and the between-person level (level 2). For this purpose, all predictor variables were centered: Person means over the 22 diary days were calculated for all predictors and subtracted from the grand mean in the sample, resulting in a mean score across all days for each individual (between-person level). Additionally, the person means were subtracted from the individual's daily scores, providing information on the daily fluctuations around one's own mean over time (within-person level; Bolger & Laurenceau, 2013). To control for time effects, a linear time variable for the 22 investigated diary days (centered on joint quit date = 0) was included in the model. To account for previous smoking, the average number of cigarettes smoked before the quit date (centered at the grand mean) was included in the model.

The outcome variable, daily number of cigarettes smoked, was a count variable with many zeros. Therefore, we used a generalized linear mixed model that specified a negative

binomial distribution with a logarithmic link function and zero inflation, with a constant zero-inflation value only (ZINB; Xie et al., 2013). Because of the logarithmic link function, the regression coefficients are on a log scale, and interpreted as rate ratios (RR). The difference to 1 is interpreted as the percentage increase (above one) or decrease (below one) in the daily number of cigarettes smoked (outcome) for a one-unit increase in the predictor (Atkins et al., 2013). All analyses were conducted in R version 3.5.1 (R Core Team, 2018) with the glmmADMB package for fitting generalized mixed models.

A maximal random effects structure was specified (Barr et al., 2013) including random slopes of all within-person predictors. In case of non-convergence, the random effects structure was successively reduced until convergence was met. To examine the amount of variance between second-level units (here individuals) in relation to total variance, intra-class correlations (ICC) for all measures were computed (Hoffman & Stawski, 2009). For descriptive purposes, reliabilities of the support seeking scale were computed: A between-person reliability RKF (reliability of the average ratings from all items and all days for a given scale measuring whether someone tends to be high or low on a given scale over time) and a within-person reliability RC (reliability of day-to-day change measuring the proportion of variability due to changes in ratings over time across individuals; Cranford et al., 2006; Shrout & Lane, 2012).

Finally, the regression model included the following predictors: The intercept, the linear time variable (centered at the quit date), gender, craving intensity, support seeking and the interaction term of these two variables at the within-person level. Additionally, the model was adjusted for craving intensity, support seeking and the interaction term at the between-person level. Further, all associations between predictors and outcome were adjusted for gender by including interaction terms with predictors and gender. A random intercept as well as random effects for time and for the within-person predictor daily support seeking could be estimated. For parsimony, we report results of the between-person level in the supplement material. As covariate at the between-person level, the grand-mean centered number of cigarettes smoked for days before the quit date was included. Due to nonsignificant correlations between socio-demographic variables (e.g., age, education, income) and the outcome, we abstained from including further between-person variables.

In sensitivity analyses the final model was adjusted for social support receipt at the between- and within-person level and the daily usage of nicotine replacement products (NRP). The sensitivity analyses are reported in the Supplementary material (Tables A2 and A3).

Results

Intra-class correlations (ICC) of all main variables are displayed in Table 1. For daily number of cigarettes smoked 82% of the variance is attributable to stable differences between smokers ($M = 4.27$, $SD = 6.08$). For craving and support seeking, half of the overall variation (47% and 51%, respectively) was explained by between-person differences. Between-person means across the diary days of support seeking indicated that overall, male and female smokers sought relatively little partner support for quitting throughout the diary phase ($M = 1.93$, $SD = 0.83$).

Results of the zero-inflated negative binomial generalized linear mixed model are reported in Table 2 (for between-person parameters see Supplementary materialTable A1). The intercept describes the estimated number of cigarettes smoked on the quit date for the average woman when all covariates equal zero. The average number of cigarettes smoked at the quit day for male and female smokers was low at about 1 cigarette (0.98) compared to about 12 cigarettes per day before the quit date. In the model, no significant linear time trend over the 22 diary days after the joint quite date was found ($b = -0.02$, $SE = 0.02$, $RR = 0.98$, $p = .085$). More daily smoking before the quit date predicted more cigarettes smoked at and after the quit date ($b = 0.03$, $SE = 0.004$, $RR = 1.03$, $p < .001$). This result indicates that with each additional cigarette smoked before the quit attempt, participants smoked 3% more cigarettes (of the approximately one cigarette at the quite date) after the quit attempt. Accordingly, with 10 additional cigarettes smoked before the quit attempt, participants smoked approximately a third more of a cigarette after the quit date.

In line with hypothesis 1, a significant within-person association of daily craving and same day number of cigarettes smoked emerged: On days when male and female

Table 2. Within-person parameter estimates from negative binomial generalized estimating equations models with zero inflation (ZINB) of the daily number of cigarettes smoked (after the joint quit date) as a function of daily craving, daily support seeking and their interaction.

Fixed effects	b	SE	95% CI LL	95% CI UL	RR
Intercept	−0.02	0.26	−0.53	0.48	0.98
Time	−0.02	0.02	−0.06	0.004	0.98
Gender (0 = female, 1 = male)	−0.03	0.06	−0.15	0.08	0.97
Time*Gender	0.01	0.004	−0.001	0.02	1.01
Number of cigarettes smoked before quit date	0.03***	0.004	0.02	0.04	1.03
Daily craving	0.17***	0.03	0.10	0.23	1.18
Daily craving*Gender	0.07	0.05	−0.03	0.16	1.07
Daily support seeking	−0.06*	0.02	−0.11	−0.01	0.94
Daily support seeking*Gender	0.03	0.04	−0.05	0.10	1.03
Daily craving*Daily support seeking	−0.16***	0.05	−0.25	−0.06	0.86
Daily craving*Daily support seeking*Gender	0.14*	0.06	0.02	0.27	1.16

Random effects (variances)[a]	Estimate	SE
Intercept	4.51	2.12
Time	0.01	0.10
Daily support seeking	<0.001	<0.001

Note. $N = 83$ couples, 22 days maximum, $n = 3015$ available days of 3652 possible diary days. b = unstandardized regression coefficients; SE = standard errors; RR = rate ratios; 95% CI = 95% confidence interval; LL = lower level; UL = upper level; *p < .05, ***p < .001.

Parameter estimates were controlled for between-person variables (for between-person parameter estimates see Supplementary material Table A1).

The R package glmmADMB does not provide significance tests for random effects.

[a]Because a full random effects variance covariance structure (using an unstructured matrix) did not converge, we used a more parsimonious variance components (VC) covariance structure on the random effects, where we could estimate the variances but set the covariance between the random effects to 0. Due to non-convergence, no random effects for daily craving, for the interaction between daily craving and daily support seeking and for all interactions of lower-level predictors with gender could be estimated.
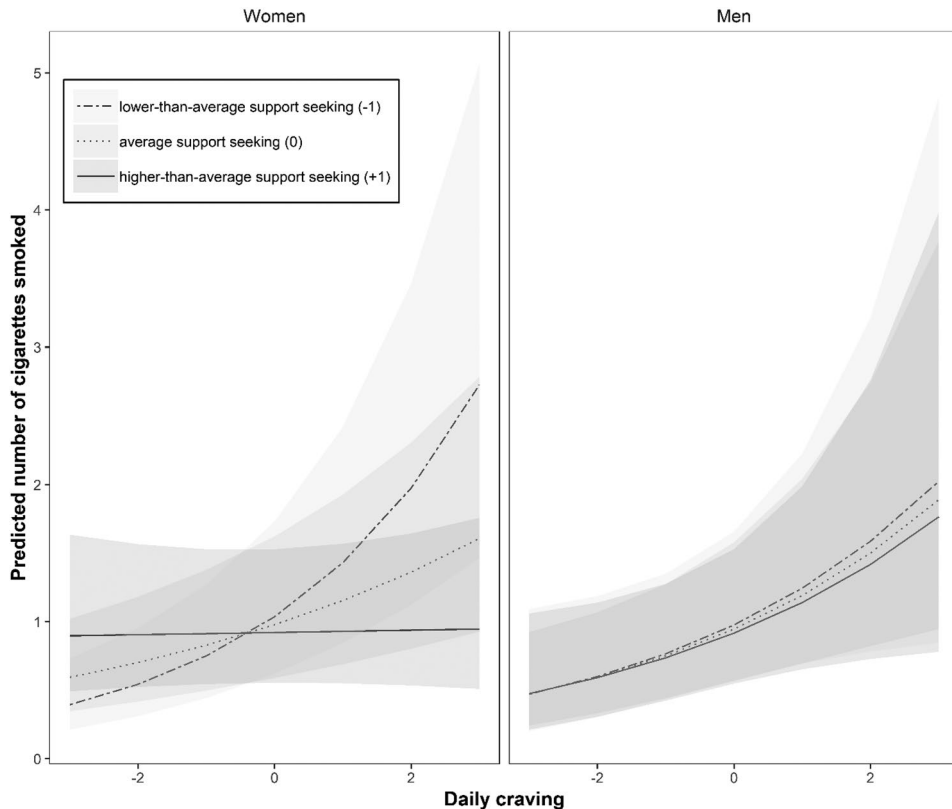
Figure 1. Illustration of the within-person interaction effect of daily craving and daily support seeking (low, average, high) on daily numbers of cigarettes smoked for male and female smokers separately. *Note.* Predicted daily number of cigarettes smoked are plotted based on the zero-inflated negative binomial generalized linear mixed model in Table 2 at the joint quit date (time = 0) for average between-person support seeking, average between-person craving and average number of cigarettes smoked before quit date.

smokers reported one unit more craving than usual, they smoked 18% more cigarettes than on days with average craving ($b = 0.17$, $SE = 0.03$, $RR = 1.18$, $p < .001$). Furthermore, number of cigarettes smoked was significantly predicted by within-person support seeking (hypothesis 2): On days when male and female smokers reported one unit more support seeking than usual, they smoked 6% fewer cigarettes than on days with average support seeking ($b = -0.06$, $SE = 0.02$, $RR = 0.94$, $p < .05$). For these associations, no gender differences were found.

In line with hypothesis 3, support seeking moderated this positive association between craving and smoking within a given day. However, the gender-adjusted interaction effect indicated that there were gender differences: Only for females (coded as gender = 0), on days when smokers reported one unit more support seeking than usual, the positive association between craving and smoking was alleviated ($b = -0.16$, $SE = 0.05$, $RR = 0.86$, $p < .001$). For male smokers this moderation effect of support seeking on the association between craving and smoking was nullified ($b = 0.14$, $SE = 0.06$, $RR = 1.16$, $p < .05$). Thus, for female smokers only, a mitigated association of craving and smoking on days with higher-than-average

seeking partner support emerged. This within-person interaction is illustrated in Figure 1.

The random intercepts indicate that female and male smokers varied considerably in their daily number of cigarettes smoked on the quit date. Other random effects were either small with large standard errors or not estimable.

As a sensitivity analysis (see Supplementary material Table A2), we also examined all the associations reported above controlled for received social support, including daily received partner support and the interaction with daily craving at the within-person level, and mean levels of received partner support and the interaction with craving at the between-person level as additional predictors in the model. The hypothesized pattern of results essentially remained the same. Only the direct within-person link between daily support seeking and cigarettes smoked did not emerge anymore. Another sensitivity analysis controlling for the daily usage of nicotine replacement products (NRP) did not change the hypothesized pattern of results (see Supplementary material Table A3). For parsimony, we report the unadjusted analysis in this article.

Discussion

The present study investigated support seeking as behavioral coping strategy for cigarette cravings during a joint self-set quit attempt of dual-smoker couples. To our knowledge, this is the first study examining support seeking from one's partner at the within-person level considering the couple as unit of analysis.

Within-person findings confirm the link between elevated craving levels and more cigarettes smoked in dual-smoker couples (hypothesis 1). This result replicated previous EMA and experimental research showing the strong predictive effect of craving on subsequent substance use (Motschman et al., 2018; Serre et al., 2015, 2018). Furthermore, it supports the assumption of the DMR and other models of addiction that consider craving as a high-risk situation driving renewed substance use at a within-person level (Auriacombe et al., 2018; Witkiewitz & Marlatt, 2004). The DMR emphasizes coping with such high-risk situations in maintaining an intended behavior change and reducing the likelihood of smoking (Witkiewitz & Marlatt, 2004). For female smokers only, we found an attenuated positive association of craving and smoking on days with higher-than-average support seeking (hypothesis 3). This suggests that especially female smokers may benefit from the buffering effects of support seeking (asking for help) in times of high stress. This gender difference might stem from gender-role stereotypes (Barbee & Cunningham, 1995; Barbee et al., 1993). Women might be more used to and comfortable with disclosing and support seeking, whereas men might see more costs of support seeking when under stress (e.g., threat to self-esteem and to autonomy; Barbee et al., 1993). Typical male stereotypes emphasize emotional inexpressiveness and handling problems independently. For men, asking for help when under stress might lead to discomfort (e.g., feeling weak and dependent) because this coping strategy is inconsistent with male gender-role expectations (Barbee et al., 1993). An experimental study has shown that men respond with more self-related processes and women with an increase in other-related responses

under stress (Tomova et al., 2014). However, no gender differences were found for the direct relation of higher than usual support seeking and fewer numbers of cigarettes smoked that same day (hypothesis 2). Support seeking might help with quitting smoking by simply being an alternative behavior to smoking (Witkiewitz & Marlatt, 2004). Apart from stressful situations (e.g., craving), support seeking might be generally beneficial by talking out and the sheer comforting presence of the partner, which in turn might contribute to the fulfilment of socio-affective needs (e.g., comfort, attention, bonding) and to cognitive processing (e.g., reframing, distancing; Greene et al., 2006; Rimé, 2009; Thoits, 2011). In turn, other phasic processes of the DMR, such as self-efficacy, outcome expectancies or affective states may lead to high-risk situations, where support seeking as coping behavior may act as moderator on the likelihood of smoking.

There is growing interest in emotion regulation in social interactions. As 'social animals', individuals tend to rely on social resources in their coping efforts with stressful events (Horn & Maercker, 2016). This view emphasizes the socio-interpersonal context in self-regulation and not limiting regulation strategies to intrapersonal processes (Horn & Maercker, 2016). Our findings confirm the relevance of interpersonal processes in the relapse process, such as support seeking as coping behavior (Hunter-Reel et al., 2009). Two recent studies showed that daily increases in received emotional and instrumental support were related to less smoking after a self-set quit date (Lüscher et al., 2017; Scholz et al., 2016). Our results emphasize, that daily support seeking has effects on the craving-smoking link independently of the support received. Although social support is a consistent part of behavioral interventions for smoking cessation (Scharf et al., 2016), the first step to elicit helpful support resources is support seeking (MacGeorge et al., 2011). How support is sought may influence whole support interactions, such as the kind and quality or matching of support provided to one's own need (Barbee & Cunningham, 1995). There may be potential negative effects of social interactions, as for example insensitive or interfering reactions of one's partner (Brooks & Dunkel Schetter, 2011), as a reaction to one's support seeking. By encouraging social support as relapse prevention strategy, an understanding how support transactions unfold over time, is crucial (Rafaeli & Gleason, 2009). Therefore, support seeking itself is a promising target for interventions, for example by training the identification of situations when support is needed, by practicing support-solicitation skills, by identifying helpful partner behaviors and by shaping interpretations of partner reactions (Fiore, 2000; Rafaeli & Gleason, 2009). Furthermore, several factors may influence if, what and how support is sought, such as support seeker or provider factors (e.g., perceived partner responsiveness; Ruan et al., 2020) relationship factors (e.g., relationship autonomy; Don & Hammond, 2017) and factors of the support context (e.g., the behavior change context; Dunkel-Schetter & Skokan, 1990; Iida et al., 2008). The context of dual-smoker couples intending to quit together may have offered favorable conditions for support seeking, because both partners may know that they share the struggles of quitting smoking and have the opportunity to reciprocate support. The experiential similarity and the symmetrical support situation may have facilitated self-disclosing for smoking cessation specific help without undermining one's evaluation of own self-efficacy (Rafaeli & Gleason, 2009; Thoits, 2011).

Strengths and limitations

A major strength of the present study is the dyadic intensive longitudinal design that captures the processes of interest on a daily basis from the self-set quit date across 21 days and allows to investigate effects at the within-person level while controlling for the between-person and couple level. Further, the present study used a dyadic approach controlling for the potential influence of the actor effects of one's partner on one's own actions (Lewis et al., 2006). Another strength is the ecological validity of the data due to the daily diary design.

However, the correlational study design does not allow for causal inferences and therefore other predictive directions cannot be negated. To address the issue of causality, an experimental design would be needed. Further, two single items for measuring emotional and practical support seeking were used, limiting the focus on a direct and verbal form of support seeking (asking for help). However, brief daily assessments are important for reducing the burden for participating in an intensive daily diary study (Bolger & Laurenceau, 2013). Regarding the single item for craving, research has shown that simple measures are both sensitive to smoking status and reliable compared to scales with more than one item (West & Ussher, 2010). A further limitation are potential memory and recall biases of self-reported smoking behavior (Shiffman, 2009). The interval of daily self-report assessments should have partially counteracted these biases. Future studies might use a more fine-graded interval-contingent and an event-contingent design (Bolger & Laurenceau, 2013) to study the dynamic relationships and temporal patterns of craving, coping and smoking in the relapse process within and between single days. A combination of micro- (e.g., daily diary designs or even assessments of several times within a day over the course of a week) and macro-time assessments (e.g., the micro-time assessment repeated every 3 months) would additionally allow to study these processes over longer time periods (e.g., measurement burst design; Nesselroade, 1991). This would also allow learning more about the temporal dynamics of these effects which is a mandatory next step for better theorizing and consequently intervening on behavioral change (Scholz, 2019). Finally, the generalizability of the current findings for other dyadic constellations is not clear and future studies should investigate these processes in different contexts (e.g., single smoker with non-smoking partner).

Conclusions

The present study demonstrates that support seeking from the partner is related to less smoking during quitting. For female smokers only, we found a buffering effect of support seeking on the craving-smoking relation. The regulation of high-risk situation (e.g., craving) during smoking cessation is crucial in preventing smoking behavior (Scharf et al., 2016). Our findings contribute to the understanding of interpersonal processes in smoking cessation (Westmaas et al., 2010) and provide insight in social support processes by emphasizing the important role of support seeking as 'first act' in initiating supportive interactions (MacGeorge et al., 2011). Future studies should follow up on effects of support seeking in behavior change efforts by investigating

temporal dynamics within and across days to further improve the understanding of forms and conditions of effective support seeking.

Acknowledgements

Disclosure of interest

Funding

ORCID

Philipp Schwaninger http://orcid.org/0000-0001-8202-3078
Janina Lüscher http://orcid.org/0000-0003-2453-1925
Corina Berli http://orcid.org/0000-0002-5078-3539
Urte Scholz http://orcid.org/0000-0003-0184-5921

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

References

Atkins, D. C., Baldwin, S. A., Zheng, C., Gallop, R. J., & Neighbors, C. (2013). A tutorial on count regression and zero-altered count models for longitudinal substance use data. *Psychology of Addictive Behaviors*, *27*(1), 166–177. https://doi.org/10.1037/a0029508

Auriacombe, M., Serre, F., Denis, C., & Fatseas, M. (2018). Diagnosis of addictions. In H. Pickard & S. Ahmed (Eds.), *The Routledge handbook of the philosophy and science of addiction* (pp. 132–144). Routledge.

Barbee, A. P., & Cunningham, M. R. (1995). An experimental approach to social support communications: Interactive coping in close relationships. *Annals of the International Communication Association*, *18*(1), 381–413. https://doi.org/10.1080/23808985.1995.11678921

Barbee, A. P., Cunningham, M. R., Winstead, B. A., Derlega, V. J., Gulley, M. R., Yankeelov, P. A., & Druen, P. B. (1993). Effects of gender role expectations on the social support process. *Journal of Social Issues*, *49*(3), 175–190. https://doi.org/10.1111/j.1540-4560.1993.tb01175.x

Barr, D. J., Levy, R., Scheepers, C., & Tily, H. J. (2013). Random effects structure for confirmatory hypothesis testing: Keep it maximal. *Journal of Memory and Language*, *68*(3), 255–278. https://doi.org/10.1016/j.jml.2012.11.001

Bolger, N., & Laurenceau, J.-P. (2013). *Intensive longitudinal methods: An introduction to diary and experience sampling research*. The Guilford Press.

Bolger, N., Zuckerman, A., & Kessler, R. C. (2000). Invisible support and adjustment to stress. *Journal of Personality and Social Psychology*, 79(6), 953–961. https://doi.org/10.1037//0022-3514.79.6.953

Brodbeck, J., Bachmann, M. S., & Znoj, H. (2013). Distinct coping strategies differentially predict urge levels and lapses in a smoking cessation attempt. *Addictive Behaviors*, 38(6), 2224–2229. https://doi.org/10.1016/j.addbeh.2013.02.001

Brooks, K. P., & Dunkel Schetter, C. (2011). Social negativity and health: Conceptual and measurement issues. *Social and Personality Psychology Compass*, 5(11), 904–918. https://doi.org/10.1111/j.1751-9004.2011.00395.x

Carver, C. S., & Connor-Smith, J. (2010). Personality and coping. *Annual Review of Psychology*, 61, 679–704. https://doi.org/10.1146/annurev.psych.093008.100352

Cohen, S. (2004). Social relationships and health. *American Psychologist*, 59(8), 676–684. https://doi.org/10.1037/0003-066X.59.8.676

Cranford, J. A., Shrout, P. E., Iida, M., Rafaeli, E., Yip, T., & Bolger, N. (2006). A procedure for evaluating sensitivity to within-person change: Can mood measures in diary studies detect change reliably? *Personality & Social Psychology Bulletin*, 32(7), 917–929. https://doi.org/10.1177/0146167206287721

Curran, P. J., & Bauer, D. J. (2011). The disaggregation of within-person and between-person effects in longitudinal models of change. *Annual Review of Psychology*, 62, 583–619. https://doi.org/10.1146/annurev.psych.093008.100356

Don, B. P., & Hammond, M. D. (2017). Social support in intimate relationships: The role of relationship autonomy. *Personality & Social Psychology Bulletin*, 43(8), 1112–1124. https://doi.org/10.1177/0146167217705119

Dunkel-Schetter, C., & Skokan, L. A. (1990). Determinants of social support provision in personal relationships. *Journal of Social and Personal Relationships*, 7(4), 437–450. https://doi.org/10.1177/0265407590074002

Federal Statistical Office. (2018). *Schweizerische Gesundheitsbefragung* 2017. https://www.bfs.admin.ch/bfsstatic/dam/assets/6426300/master

Fiore, M. C. (2000). US public health service clinical practice guideline: Treating tobacco use and dependence. *Respiratory Care*, 45(10), 1200–1262.

Greene, K., Derlega, V. J., & Mathews, A. (2006). Self-disclosure in personal relationships. In A. L. Vangelisti & D. Perlman (Eds.), *The Cambridge handbook of personal relationships* (pp. 409–427). Cambridge University Press.

Heatherton, T. F., Kozlowski, L. T., Frecker, R. C., & Fagerström, K.-O. (1991). The Fagerström Test for Nicotine Dependence: A revision of the Fagerström Tolerance questionnaire. *British Journal of Addiction*, 86(9), 1119–1127. https://doi.org/10.1111/j.1360-0443.1991.tb01879.x

Hendershot, C. S., Witkiewitz, K., George, W. H., & Marlatt, G. A. (2011). Relapse prevention for addictive behaviors. *Substance Abuse Prevention, Treatment, and Policy*, 6(17), 1–17. https://doi.org/10.1186/1747-597X-6-17

Hoffman, L., & Stawski, R. S. (2009). Persons as contexts: Evaluating between-person and within-person effects in longitudinal analysis. *Research in Human Development*, 6(2-3), 97–120. https://doi.org/10.1080/15427600902911189

Homish, G. G., & Leonard, K. E. (2005). Spousal influence on smoking behaviors in a US community sample of newly married couples. *Social Science & Medicine*, 61(12), 2557–2567. https://doi.org/10.1016/j.socscimed.2005.05.005

Horn, A. B., & Maercker, A. (2016). Intra- and interpersonal emotion regulation and adjustment symptoms in couples: The role of co-brooding and co-reappraisal. *BMC Psychology*, 4(1), 51. https://doi.org/10.1186/s40359-016-0159-7

Hughes, J. R., Keely, J., & Naud, S. (2004). Shape of the relapse curve and long-term abstinence among untreated smokers. *Addiction*, 99(1), 29–38. https://doi.org/10.1111/j.1360-0443.2004.00540.x

Hughes, J. R., Solomon, L. J., Fingar, J. R., Naud, S., Helzer, J. E., & Callas, P. W. (2013). The nat-ural history of efforts to stop smoking: A prospective cohort study. *Drug Alcohol Dependence*, *128*(1-2), 171–174. https://doi.org/10.1016/j.drugalcdep.2012.08.010

Hunter-Reel, D., McCrady, B., & Hildebrandt, T. (2009). Emphasizing interpersonal factors: An extension of the Witkiewitz and Marlatt relapse model. *Addiction*, *104*(8), 1281–1290. https://doi.org/10.1111/j.1360-0443.2009.02611.x

Iida, M., Seidman, G., Shrout, P. E., Fujita, K., & Bolger, N. (2008). Modeling support provision in intimate relationships. *Journal of Personality and Social Psychology*, *94*(3), 460–478. https://doi.org/10.1037/0022-3514.94.3.460

Jackson, S. E., Steptoe, A., & Wardle, J. (2015). The influence of partner's behavior on health behavior change: The English Longitudinal Study of Ageing. *JAMA Internal Medicine*, *175*(3), 385–392. https://doi.org/10.1001/jamainternmed.2014.7554

Kenny, D. A., Kashy, D. A., & Cook, W. L. (2006). *Dyadic data analysis*. The Guilford Press.

Klemperer, E. M., & Hughes, J. R. (2016). Does the magnitude of reduction in cigarettes per day predict smoking cessation? A qualitative review. *Nicotine & Tobacco Research*, *18*(1), 88–92. https://doi.org/10.1093/ntr/ntv058

Klemperer, E. M., Hughes, J. R., & Naud, S. (2019). Reduction in cigarettes per day prospective-ly predicts making a quit attempt: A fine-grained secondary analysis of a natural history study. *Nicotine & Tobacco Research*, *21*(5), 648–654. https://doi.org/10.1093/ntr/nty056

Kraaij, V., & Garnefski, N. (2019). The Behavioral Emotion Regulation Questionnaire: Development, psychometric properties and relationships with emotional problems and the Cognitive Emotion Regulation Questionnaire. *Personality and Individual Differences*, *137*, 56–61. https://doi.org/10.1016/j.paid.2018.07.036

Lewis, M. A., McBride, C. M., Pollak, K. I., Puleo, E., Butterfield, R. M., & Emmons, K. M. (2006). Understanding health behavior change among couples: An interdependence and communal coping approach. *Social Science & Medicine*, *62*(6), 1369–1380. https://doi.org/10.1016/j.socscimed.2005.08.006

Lüscher, J., & Scholz, U. (2017). Does social support predict smoking abstinence in dual-smoker couples? Evidence from a dyadic approach. *Anxiety Stress Coping*, *30*(3), 273–281. https://doi.org/10.1080/10615806.2016.1270448

Lüscher, J., Stadler, G., & Scholz, U. (2017). A daily diary study of joint quit attempts by dual-smoker couples: The role of received and provided social support. *Nicotine & Tobacco Research*, *20*(1), 100–107. https://doi.org/10.1093/ntr/ntx079

MacGeorge, E. L., Feng, B., & Burleson, B. R. (2011). Supportive communication. In M. L. Knapp & J. A. Daly (Eds.), *The SAGE handbook of interpersonal communication* (pp. 317–354). SAGE Publications.

Marlatt, A. G., & Gordon, J. R. (1985). *Relapse prevention*. The Guilford Press.

Motschman, C. A., Germeroth, L. J., & Tiffany, S. T. (2018). Momentary changes in craving pre-dict smoking lapse behavior: A laboratory study. *Psychopharmacology*, *235*(7), 2001–2012. https://doi.org/10.1007/s00213-018-4898-4

Müller, V., Mucha, R. F., Ackermann, K., & Pauli, P. (2001). Die Erfassung des Cravings bei Rauchern mit einer deutschen Version des "Questionnaire on Smoking Urges" (QSU-G). *Zeitschrift für Klinische Psychologie und Psychotherapie*, *30*(3), 164–171. https://doi.org/10.1026/0084-5345.30.3.164

Nesselroade, J. R. (1991). The warp and woof of the developmental fabric. In R. Downs, L. Liben, & D. S. Palermo (Eds.), *Visions of aesthetics, the environment, and development: The legacy of Joachim F. Wohwill* (pp. 213–240). Lawrence Erlbaum Associates.

O'Connell, K. A., Hosein, V. L., & Schwartz, J. E. (2006). Thinking and/or doing as strategies for resisting smoking. *Research in Nursing & Health*, *29*(6), 533–542. https://doi.org/10.1002/nur.20151

O'Connell, K. A., Hosein, V. L., Schwartz, J. E., & Leibowitz, R. Q. (2007). How does coping help people resist lapses during smoking cessation? *Health Psychology*, *26*(1), 77–84. https://doi.org/10.1037/0278-6133.26.1.77

Peters, E. N., & Hughes, J. R. (2009). The day-to-day process of stopping or reducing smoking: A prospective study of self-changers. *Nicotine & Tobacco Research*, *11*(9), 1083–1092. https://doi.org/10.1093/ntr/ntp105

R Core Team. (2018). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing.

Rafaeli, E., & Gleason, M. E. J. (2009). Skilled support within intimate relationships. *Journal of Family Theory & Review*, *1*(1), 20–37. https://doi.org/10.1111/j.1756-2589.2009.00003.x

Rimé, B. (2009). Emotion elicits the social sharing of emotion: Theory and empirical review. *Emotion Review*, *1*(1), 60–85. https://doi.org/10.1177/1754073908097189

Ruan, Y., Reis, H. T., Clark, M. S., Hirsch, J. L., & Bink, B. D. (2020). Can I tell you how I feel? Perceived partner responsiveness encourages emotional expression. *Emotion*, *20*(3), 329–342. https://doi.org/10.1037/emo0000650

Sayette, M. A. (2016). The role of craving in substance use disorders: Theoretical and methodological issues. *Annual Review of Clinical Psychology*, *12*, 407–433. https://doi.org/10.1146/annurev-clinpsy-021815-093351

Scharf, D. M., Ferguson, S. G., Tindle, H., & Shiffman, S. (2016). Smoking cessation. In J. C. Norcross, G. R. VandenBos, D. K. Freedheim, & N. Pole (Eds.), *APA handbooks in psychology®. APA handbook of clinical psychology. Psychopathology and health* (pp. 535–549). American Psychological Association. https://doi.org/10.1037/14862-025

Scholz, U. (2019). It's time to think about time in health psychology. *Applied Psychology: Health and Well-Being*, *11*(2), 173–186. https://doi.org/10.1111/aphw.12156

Scholz, U., Stadler, G., Ochsner, S., Rackow, P., Hornung, R., & Knoll, N. (2016). Examining the relationship between daily changes in support and smoking around a self-set quit date. *Health Psychology*, *35*(5), 514–517. https://doi.org/10.1037/hea0000286

Schwarzer, R., & Knoll, N. (2007). Functional roles of social support within the stress and coping process: A theoretical and empirical overview. *International Journal of Psychology*, *42*(4), 243–252. https://doi.org/10.1080/00207590701396641

Serre, F., Fatseas, M., Denis, C., Swendsen, J., & Auriacombe, M. (2018). Predictors of craving and substance use among patients with alcohol, tobacco, cannabis or opiate addictions: Commonalities and specificities across substances. *Addictive Behaviors*, *83*, 123–129. https://doi.org/10.1016/j.addbeh.2018.01.041

Serre, F., Fatseas, M., Swendsen, J., & Auriacombe, M. (2015). Ecological momentary assessment in the investigation of craving and substance use in daily life: A systematic review. *Drug and Alcohol Dependence*, *148*, 1–20. https://doi.org/10.1016/j.drugalcdep.2014.12.024

Shiffman, S. (2005). Dynamic influences on smoking relapse process. *Journal of Personality*, *73*(6), 1715–1748. https://doi.org/10.1111/j.0022-3506.2005.00364.x

Shiffman, S. (2009). How many cigarettes did you smoke? Assessing cigarette consumption by global report, Time-Line Follow-Back, and ecological momentary assessment. *Health Psychology*, *28*(5), 519–526. https://doi.org/10.1037/a0015197

Shiffman, S., West, R., & Gilbert, D. (2004). Recommendation for the assessment of tobacco craving and withdrawal in smoking cessation trials. *Nicotine & Tobacco Research*, *6*(4), 599–614. https://doi.org/10.1080/14622200410001734067

Shrout, P. E., & Lane, S. P. (2012). Psychometrics. In M. R. Mehl & T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 302–320). Guilford.

Skinner, E. A., Edge, K., Altman, J., & Sherwood, H. (2003). Searching for the structure of coping: A review and critique of category systems for classifying ways of coping. *Psychological Bulletin*, *129*(2), 216–269. https://doi.org/10.1037/0033-2909.129.2.216

Stanaway, J. D., Afshin, A., Gakidou, E., Lim, S. S., Abate, D., Abate, K. H., Abbafati, C., Abbasi, N., Abbastabar, H., Abd-Allah, F., Abdela, J., Abdelalim, A., Abdollahpour, I., Abdulkader, R. S., Abebe, M., Abebe, Z., Abera, S. F., Abil, O. Z., Abraha, H. N., … Murray, C. J. L. (2018). Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks for 195 countries and territories, 1990–2017: A systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*, *392*(10159), 1923–1994. https://doi.org/10.1016/S0140-6736(18)32225-6

Stanton, M. (2005). Relapse prevention needs more emphasis on interpersonal factors. *The American Psychologist*, *60*(4), 340–341. https://doi.org/10.1037/0003-066X.60.4.340

Thoits, P. A. (2011). Mechanisms linking social ties and support to physical and mental health. *Journal of Health and Social Behavior*, *52*(2), 145–161. https://doi.org/10.1177/0022146510395592

Tomova, L., Dawans, B. v., Heinrichs, M., Silani, G., & Lamm, C. (2014). Is stress affecting our ability to tune into others? Evidence for gender differences in the effects of stress on self-other distinction. *Psychoneuroendocrinology*, *43*, 95–104. https://doi.org/10.1016/j.psyneuen.2014.02.006

West, R., & Ussher, M. (2010). Is the ten-item Questionnaire of Smoking Urges (QSU-brief) more sensitive to abstinence than shorter craving measures? *Psychopharmacology*, *208*(3), 427–432. https://doi.org/10.1007/s00213-009-1742-x

Westmaas, J. L., Bontemps-Jones, J., & Bauer, J. E. (2010). Social support in smoking cessation: Reconciling theory and evidence. *Nicotine & Tobacco Research*, *12*(7), 695–707. https://doi.org/10.1093/ntr/ntq077

Wills, T. A., & Shiffman, S. (1985). Coping and substance use: A conceptual framework. In S. Shiffman & T. A. Wills (Eds.), *Coping and substance use* (pp. 3–24). Academic Press.

Witkiewitz, K., & Marlatt, G. A. (2004). Relapse prevention for alcohol and drug problems: That was Zen, this is Tao. *The American Psychologist*, *59*(4), 224–235. https://doi.org/10.1037/0003-066X.59.4.224

Wray, J. M., Gass, J. C., & Tiffany, S. T. (2013). A systematic review of the relationships between craving and smoking cessation. *Nicotine & Tobacco Research*, *15*(7), 1167–1182. https://doi.org/10.1093/ntr/nts268

Xie, H., Tao, J., McHugo, G. J., & Drake, R. E. (2013). Comparing statistical methods for analyzing skewed longitudinal count data with many zeros: An example of smoking cessation. *Journal of Substance Abuse Treatment*, *45*(1), 99–108. https://doi.org/10.1016/j.jsat.2013.01.005