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Examining the relationships between mindfulness and tobacco craving factors

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Abstract

Background. Relationships between mindfulness and general craving have been documented. However, there is still no data regarding relationships between mindfulness and the different craving factors.

Methods. Using data from an online survey among hospital workers smoking tobacco in France (n=127), we performed linear regression models with the four craving factors as outcomes, and dispositional mindfulness as explanatory variable.

Results. After adjusting for nicotine dependence, mindfulness was negatively associated with general craving and three out of four craving factors (emotionality, compulsivity and purposefulness, but not expectancy).

Conclusions. These results support the implementation of mindfulness-based interventions in the context of tobacco cessation attempt.

Introduction

Research on mindfulness as a treatment for substance use disorder is proliferating with promising results (1,2). Specifically, some observational and interventional studies suggested an effect of mindfulness on craving and subsequent substance use (3–6). Noticeably, mindfulness seemed to attenuate substance craving through a moderating effect on negative affect (7,8). Recently, Mallik et al.'s, from a sample of patients who completed treatment for substance use disorders, suggested that both mindfulness and psychological flexibility contributed to variance in substance craving, while controlling for severity dependence (9). Such a putative role of mindfulness in craving management have also been highlighted for tobacco smoking (5,10). As for other substances, mindfulness seemed to impact craving at least partly through negative affect modulation (11,12). Moreover, mindfulness training may be effective for smoking cessation by decoupling the association between craving and smoking (13). As stronger tobacco craving is associated with poorer smoking cessation outcomes (14,15), there is a need to fully elucidate the potential role of mindfulness in craving attenuation in order to optimize mindfulness-based interventions for tobacco cessation.

However, all the aforementioned studies assessed craving using unidimensional measures. Even when assessed through multiple-item questionnaire, the varied nature of craving experienced by individuals cannot be captured through a single measure (16–18). To overcome this limitation, a multidimensional self-report instrument to assess craving has

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3 been developed (19), and validated for tobacco craving (20). To date, there is no data
4 regarding the relationship between mindfulness and each of the four factors conceptualizing
5 craving (20). Yet, exploring such relationships may highlight a different influence of
6 mindfulness on each factor, thus providing new elements regarding the modulation of
7 substance use by mindfulness. Such differentiated influence may also imply a different
8 responsiveness of participants to mindfulness-based interventions according to their craving
9 profile.
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14 The current study explored the relationships between trait mindfulness and the
15 different tobacco craving factors in a sample of French hospital workers smoking tobacco.
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19 **Materials and methods**

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22 Data were derived from an online survey conducted in April-June 2020 among people
23 working in two hospitals located in Southern France. Participants were reached through their
24 professional email address, and there were no further inclusion criteria than being a tobacco
25 smoker. Participants had to provide consent online to access the survey. Age was
26 characterized by belonging to one of five age groups. The Fagerström Test for Nicotine
27 Dependence (FTND) (21) and the French version of the 12-item Tobacco Craving
28 Questionnaire (FTCQ-12) (22) were administered to participants reporting current tobacco
29 use. The FTCQ-12 comprises 12 items (for instance 'If I were smoking now I could think
30 more clearly') rated on a Likert-type scale from 1 (strongly disagree) to 7 (strongly agree).
31 Each factor included 2 to 4 items. General and factor craving scores were calculated as the
32 mean rating of their constituting items (leading to scores ranging from 1 to 7). The four
33 factors are: (a) emotionality, or smoking in anticipation of relief from withdrawal symptoms or
34 negative mood, (b) expectancy, or anticipation of positive outcomes from smoking, (c)
35 compulsivity, or a lack of control over tobacco use, and (d) purposefulness, or intention and
36 planning to smoke for positive outcomes (20). Participants also completed the Mindful
37 Attention Awareness Scale (MAAS) (23,24). The MAAS is a 15-item, single-factor structured
38 scale. Each item (for instance 'I could be experiencing some emotion and not be conscious
39 of it until some time later') is scored between 1 ('almost always') and 6 ('almost never'). The
40 overall score is the mean of the scores for the 15 items (i.e. ranging from 1 to 6), with a
41 higher value denoting greater mindfulness. Cronbach's alpha was computed for general and
42 factor craving scores, and the MAAS and FTND scores. Associations between the MAAS
43 score and craving scores were investigated using separate linear regression models with
44 robust standard errors, for the general craving score and the four craving factors as
45 outcomes, with and without adjustment for the FTND score. The MAAS and FTND scores
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3 were tested as continuous explanatory variables. The threshold for statistical significance
4 was set at $\alpha = 0.05$. All analyses were performed with the Stata version 14.2 for Windows
5 (StataCorp, College Station, Texas, USA) software.
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9 10 **Results**

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12 Twelve participants were excluded because of incomplete FTCQ-12 item filling. Our
13 study sample consisted in 127 tobacco smokers (18.9% male, 35.4% in the age group 31-40
14 years), with a median [interquartile range (IQR)] MAAS score of 3.73 [3.13 – 4.53], a median
15 [IQR] FTND score of 2 [0-4], and a median [IQR] general craving score of 3.25 [2.67 – 4.17].
16 The profession category most represented was 'direct contact profession other than
17 physician', with 57 (46.0%) participants, followed by 'administrative profession' (26.6%),
18 'engineering, logistics and technical functions' (16.9%) and 'physician' (10.5%).
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24 Cronbach's alpha was of 0.913 for the MAAS score, 0.6269 for the FTND score,
25 0.835 for the general craving score, 0.824 for emotionality, 0.674 for expectancy, 0.697 for
26 compulsivity and 0.375 for purposefulness (which included only two items). Regarding the
27 profession category of the participants, 10.2% were physicians, 44.9% were other healthcare
28 professionals, 26.0% worked in administration, and 16.5% had engineering, logistic and
29 technical functions. Three quarter of them lived in a house (vs. in an apartment), and 21.3%
30 lived alone.
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35 In the regression models, the MAAS score was negatively associated with all craving
36 scores, except for expectancy score, including after adjustment for the nicotine dependence
37 score (**Table 1**).
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42 **Discussion**

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44 To our knowledge, it is the first time that mindfulness is explored in relation with
45 craving factors among tobacco smokers. Our results suggest that, for tobacco use,
46 mindfulness is negatively associated with general craving and three of the four craving
47 factors (i.e. emotionality, compulsivity, and purposefulness, but not expectancy). Results
48 regarding general craving are in line with previous studies (5,9). Results regarding the four
49 validated factors capturing fully the theoretical and experiential breadth of the concept of
50 craving are original. However, they are in line with previous observations on the relationship
51 between mindfulness and emotion regulation (25) and compulsivity (26). Mindfulness is also
52 likely to inhibit the automatic development of intentions and plans related to smoking for
53 positive outcomes (i.e. purposefulness) by limiting mind wandering (27). Such results imply
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3 that mindfulness has a large impact on craving as a phenomenon, embracing almost all its
4 dimensions. Those result also imply that modulating trait mindfulness is likely to impact
5 tobacco craving in virtually all craving profile (i.e. whatever smokers' respective values for
6 each factor), and thus support the implementation of mindfulness-based interventions to
7 increase trait mindfulness in the context of tobacco cessation attempt.
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11 Trait mindfulness was not associated with the expectancy factor, i.e. anticipation of
12 positive outcomes from smoking. It means that tobacco users with high expectancy may be
13 less responsive to increased mindfulness in terms of craving reduction and subsequent
14 tobacco use. Therefore, other types of intervention (alone or in combination with
15 mindfulness-based interventions) may be more suitable for them, such as cognitive
16 behavioural therapy, to help them fulfil their expectancies through other ways and/or to
17 change their beliefs. Therefore, assessing craving profile of smokers may be of help in the
18 future to determine which interventions are most effective for whom (28). As smoking
19 expectancies are associated with motivation to quit (29), our results also suggest that
20 ensuring a sufficient motivation level before implementing mindfulness-based interventions
21 for quitting is as necessary as for other types of interventions.
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29 Affect management is a strong component of smoking expectancies (30–32).
30 However, as one study previously found a negative correlation between MAAS and negative
31 affect reduction expectancies (without reference to craving) among daily smokers (33),
32 duplication of our results would be needed to ensure their generalizability.
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36 Previous findings supported the four-factor model of craving for other substances
37 such as alcohol (34), amphetamine (35), cocaine (36), heroin (37) and cannabis (19). As
38 expectancies related to those substances may differ from those related to tobacco, there is a
39 need to confirm our results in the context of craving for other substances. As we used a
40 single-dimension scale to assess mindfulness, further research is needed to test for specific
41 association between mindfulness facets and craving factors.
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47 **Acknowledgments**

48 We thank all the survey participants.
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51 **Declaration of interest statement**

52 Authors declare no competing interest.
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Table 1: Associations between mindfulness and tobacco craving scores (unadjusted and adjusted linear regression models, n=127)

	General craving score		Emotionality score		Expectancy score		Compulsivity score		Purposefulness score	
Model 1: unadjusted associations between MAAS score and craving scores										
	Coef. [95% CI]	<i>p</i> -value	Coef. [95% CI]	<i>p</i> -value	Coef. [95% CI]	<i>p</i> -value	Coef. [95% CI]	<i>p</i> -value	Coef. [95% CI]	<i>p</i> -value
MAAS score	-0.29 [-0.49; -0.09]	0.005	-0.29 [-0.53; -0.05]	0.019	-0.11 [-0.39; 0.18]	0.464	-0.40 [-0.67; -0.13]	0.004	-0.39 [-0.63; -0.15]	0.002
Model 2: associations between MAAS score and craving scores adjusted for nicotine dependence score										
	aCoef. [95% CI]	<i>p</i> -value	aCoef. [95% CI]	<i>p</i> -value	aCoef. [95% CI]	<i>p</i> -value	aCoef. [95% CI]	<i>p</i> -value	aCoef. [95% CI]	<i>p</i> -value
MAAS score	-0.35 [-0.56; -0.14]	0.001	-0.39 [-0.65; -0.12]	0.005	-0.15 [-0.46; 0.16]	0.329	-0.47 [-0.75; -0.19]	0.001	-0.39 [-0.65; -0.14]	0.003
FTND score	0.09 [-0.00; 0.19]	0.051	0.06 [-0.06; 0.17]	0.323	0.14 [0.01; 0.28]	0.034	0.11 [-0.02; 0.23]	0.106	0.07 [-0.06; 0.20]	0.275

FTND, Fagerström Test for Nicotine Dependence; MAAS, Mindful Attention Awareness Scale; Coef., regression coefficient; aCoef., adjusted regression coefficient; CI, confidence interval.