



The developmental sequence of tobacco withdrawal symptoms of wanting, craving and needing

Joseph R. DiFranza*, W.W. Sanouri Ursprung, Leah Biller

Department of Family Medicine and Community Health, University of Massachusetts Medical School, 55 Lake Avenue, Worcester, MA 01655, United States

ARTICLE INFO

Article history:

Received 13 May 2011

Received in revised form 7 September 2011

Accepted 17 October 2011

Available online 21 October 2011

Keywords:

Tobacco
Smoking
Addiction
Dependence
Diagnosis

ABSTRACT

Objective: The first case series on tobacco addiction suggested that withdrawal symptoms evolve through a clear developmental sequence both over the clinical course and during an episode of abstinence. The objective of the current study was to determine if this observation would be confirmed by a second case series.

Methods: The subjects were 25 adolescent and adult smokers. Subjects were provided with operational definitions of the withdrawal symptoms of wanting, craving and needing. Using nondirective techniques, detailed histories of subjects' experiences with these three symptoms during abstinence from tobacco were obtained in individual interviews.

Results: All 25 subjects identified the operational definitions of wanting and craving as symptoms they had experienced, and 21 subjects indicated that the definition of needing described a symptom they had experienced. All 25 subjects reported that wanting was the first symptom they had experienced; 24 of 25 subjects reported that craving was the second symptom experienced; and 20 of the 21 subjects that had experienced needing reported that this was the third symptom they had experienced. All subjects reported that during abstinence symptoms appeared in the order of wanting, craving and needing. Subjects reported that stress-induced urges to smoke are not relieved by smoking, do not follow a characteristic sequence, and do not have a latency.

Conclusions: Abstinence from tobacco provokes characteristic symptoms of wanting, craving and needing that are widely endorsed by smokers as symptoms they have experienced. These symptoms develop in a set sequence of wanting, craving and needing in all, or nearly all, smokers over their clinical course. These symptoms recur in the same sequence during acute episodes of abstinence. Smokers can distinguish between four symptoms: wanting, craving, needing and stress-induced urges to smoke, but these distinctions are not captured by generic 'craving' measures.

© 2011 Elsevier Inc. All rights reserved.

1. Introduction

Case series are instrumental in determining the clinical course of diseases (Yin, 2009). We published the first case series describing the symptoms of tobacco addiction in 2010 (DiFranza et al., 2010). Our primary discovery was that the symptoms of withdrawal appear to evolve through a characteristic sequence. Initially, the only symptom experienced during abstinence may be a mild desire to smoke that many smokers call 'wanting'. Wanting is short-lived and easily ignored and does not intrude upon their thoughts (DiFranza et al., 2010). With continued use, smokers may develop a more intense and intrusive desire to smoke that many call 'craving'. Craving is more persistent and harder to ignore: it interrupts

their concentration. Later in the clinical course, the desire to smoke that is prompted by withdrawal may intensify to a point where it is impossible to ignore (DiFranza et al., 2010). Smokers cannot concentrate on anything other than their urgent need to smoke, and feel they need a cigarette just to feel, think and function normally again. Many smokers refer to this symptom as 'needing' a cigarette. Needing is distinguished qualitatively from craving by its unremitting urgency and the fact that it cannot be ignored.

Some smokers reported that early in their clinical course, when abstinent they experienced only wanting. Later, wanting would be followed by craving, and ultimately wanting and craving would be followed by needing. The sequence of symptom presentation during a single episode of abstinence (wanting, craving, then needing) appeared to recapitulate the sequence in which these symptoms evolved over the clinical course (wanting, craving, then needing). One limitation of this first case series was that this sequence was recognized post hoc during the data analysis, and subjects had not been asked if their symptoms followed this pattern. A second limitation is that subjects were not provided specific definitions

* Corresponding author. Tel.: +1 774 442 5658; fax: +1 774 442 6212.

E-mail addresses: difranzj@umhc.org (J.R. DiFranza),

Sanouri.Ursprung@umassmed.edu (W.W.S. Ursprung), Leah.Biller@umassmed.edu (L. Biller).

for terms, so it is not entirely clear that subjects were all using the terms wanting, craving and needing to indicate the same experiences.

Kozlowski warned that smokers are not consistent in their use of the word craving, and recommended that terms with “precise and explicit specification” be used (Kozlowski et al., 1989; Kozlowski and Wilkinson, 1987). Accordingly, we developed specific operational definitions for the terms wanting, craving and needing. Objectives for the current study were (1) to determine if our operational definitions are valid descriptions of symptoms, and (2) to determine if smokers share a common experience concerning the sequence of symptom presentation over the clinical course, and during acute episodes of abstinence.

2. Methods

2.1. Subjects

Subjects were recruited online through Craigslist and word of mouth to a targeted enrollment of 25. Subjects had to be at least 14 years old and currently smoking at least one cigarette per month. Subjects received \$20 for participating.

2.2. Interview protocol

A confidential semi-structured interview was conducted with each subject, in person or by phone, by medical interviewers (S.U. and L.B.) who obtained informed consent. The interviewers were trained by rehearsing the interview with volunteers while being observed to establish proficiency and fidelity with the interview protocol. The interviews were recorded. Ethical approval was provided by the University of Massachusetts Medical School. The study was conducted during 2009 and 2010.

The interview started with the collection of data concerning the age of initiation of smoking and current smoking practices. A brief questionnaire was used to administer the Hooked on Nicotine Checklist (HONC) and the Autonomy over Tobacco Scale (AUTOS) (DiFranza et al., 2009; Wellman et al., 2005). The interviewer then provided the subject with operational definitions for wanting, craving and needing as follows: “I am going to define some terms for you. First we are going to talk about ‘wanting a cigarette’. Wanting a cigarette is a mild urge to smoke that will go away if you ignore it.” “The second term I want to define is ‘craving a cigarette’. Craving is when the desire for a cigarette is so strong that it is hard to ignore and it interrupts your concentration.” “The last term I want to define is ‘needing a cigarette’. When smokers go too long without a cigarette, they can experience withdrawal symptoms such as intense craving, irritability, a bad mood, restlessness, and trouble concentrating. When someone needs a cigarette, they can’t think of anything other than smoking and they know they will have to smoke a cigarette just to feel normal again.” These definitions were repeated during the interview. These operational definitions summarized the descriptions of symptoms provided by our first 50 cases (DiFranza et al., 2010). After each definition was provided, subjects were asked if the definition was clear, and if that symptom was something that they had experienced. To assess their understanding of these definitions, subjects were asked how they would describe their own experience with that symptom to someone who did not smoke.

After subjects expressed a clear understanding of these definitions, the reviewer returned to the subject of wanting and repeated the definition. Subjects were then asked “Is wanting a cigarette something that you always experience if you go too long without a cigarette?” The phrase “if you go too long without a cigarette” is needed to establish that the symptom is triggered by withdrawal. If subjects indicated that they always experienced wanting after

having gone too long without smoking, a detailed history was obtained concerning how long they had been smoking and how much they were smoking when they first experienced the symptom. The same approach was then used to obtain detailed histories of craving and needing. This established a record of the duration of smoking at the point in time when each symptom was first experienced, and this was done before subjects were asked in what order symptoms appeared.

Next, subjects were asked in what order the symptoms had appeared over the duration of their smoking career, and in what order the symptoms appear if they are unable to smoke. As smokers experience a desire to smoke even when they are not experiencing withdrawal, subjects were asked to identify factors other than abstinence that brought on wanting, craving and needing.

2.3. Data analysis

Transcriptions of the recordings were read (by JD) to determine (1) whether the subject felt that the definitions described their own experiences; (2) whether the subject reported experiencing the symptoms of wanting, craving or needing; (3) the order in which symptoms appeared over the clinical course; (4) the order in which symptoms appeared during abstinence; and (5) factors other than abstinence that triggered similar symptoms.

3. Results

3.1. Subjects

The 25 subjects were 16–52 years of age (mean 24.5, SD 7.5), 56% female, 12% black, 16% Hispanic, and 72% non-Hispanic white. The mean age of smoking initiation was 14.9 years (range 7–20; SD 3.0). The mean duration of smoking was 10.9 years (SD 10.9). Subjects smoked an average of 28.5 days per month (range 22–30; SD 2.9); 7 were nondaily smokers, but of these, 2 smoked 29 days per month. The average daily cigarette consumption was 10.5 (range 2–20; SD 5.7). The mean AUTOS score was 20.0 (range 8–30; SD 5.9), the mean HONC score was 7.3 (range 3–10; SD 2.2). Subjects reported having made a median of 2 quit attempts (range 0–100; SD 21.1, mean 3.2 when the one outlier was removed).

3.2. Experiences of wanting, craving and needing

All 25 subjects identified the operational definitions of wanting and craving as symptoms they had experienced, and 21 subjects indicated that the definition of needing described a symptom they had experienced.

Table 1 provides some of the descriptions subjects provided when asked to describe symptoms in their own words. Wanting was described by many as a “mental” experience (thought) similar to a desire for snacks. Craving was often described as a “physical” experience with subjects describing sensations in their abdomen, chest and oral cavity. Two subjects experienced salivation with craving, while another reported a dry mouth. Needing was described as both an emotional and physical experience. Subjects reported impatience, irritability, restlessness, short temper and anger, and in addition to the physical symptoms described for craving, subjects described also shaky hands and headache.

3.3. The order in which symptoms appeared over the clinical course

All 25 subjects reported that wanting was the first symptom experienced; 24 of 25 reported craving was the second symptom; and 20 of 21 subjects that had experienced needing reported that this was the third symptom experienced. For 24 subjects, symptoms

Table 1
Smokers' descriptions of wanting, craving and needing experienced as withdrawal symptoms.

Wanting
"It just feels like any other time when you want food or you want some chocolate" (31 yr white female).
"Kind of like wanting a piece of chocolate" (45 yr old white female).
"It's about the same as wanting to snack I guess. It's not like I'm hungry, but I would enjoy it" (21 yr old white female).
"It's like an internal clock I guess. The wanting is kind of timed in my case" (25 yr old white female).
"Like your brain wants it" (22 yr old white male).
"It's something in my brain like ... I don't know, something in my brain that goes off, not necessarily telling me, but just the feeling of it" (20 yr old white male).
"If I'm in a place where I can't smoke, a restaurant or whatever, a fleeting thought goes through my mind, but it's not possible, so it just gets pushed to the back of my head" (22 yr old white female).
"The want I can subconsciously stop" (22 yr old white male).
Craving
"Craving would kind of be like the feeling of want, except just multiplied by like ten. So it's pretty much the same feeling, but just much, much more, because it's the same feeling of anticipation" (17 yr old white male).
"Whereas previously I sort of defined wanting as something like mental and sort of like a more mental exercise, but a craving is quite physical" (25 yr old white female).
"Something in my gut that just tells me it's time for a cigarette...and this is going to sound weird, but I've noticed maybe like ... maybe my saliva ... something in my mouth tells me" (24 yr old white female).
"That's when you get the feeling in my mouth. I don't know ... it feels like I'm getting dry mouth. It's really weird. And I can't explain it, but that's how it starts" (36 yr old Hispanic female).
"For me, I get like a pit in my stomach where I'm like, I've got to have a cigarette. I crave a cigarette. It's almost like a hunger pain" (45 yr old white female).
"Tightness in my chest and a little anxious, distracted" (52 yr old white female).
Needing
"I just get mad when I don't have a cigarette for a long time. Everything kind of sets me off, and all my muscles all tense up" (21 yr old white male).
"That feeling is, unfortunately, something similar to being extremely, extremely hungry, like you haven't eaten in days, and you feel like your body needs you to eat, whereas like your body needs you to smoke. It's no longer you want to, or you just have the desire to; it becomes a point where your body is like sending off some kind of signal that's saying, 'Okay, it's way past time. Now you like have to'" (26 yr old black male).
"Just very short-tempered and very hasty to finish whatever you need to do to get out and smoke a cigarette." "Almost panic I would say. Like nothing else really matters at that point, like I just need a cigarette" (24 yr old white female)
"Whereas a craving you can easily do different activities to get your mind off of smoking, with the needing a cigarette, no matter what you can do, even if you can still concentrate enough to function just fine, it's kind of like always something in the back of your mind that you just can't wait. And then, too, like you get different physical symptoms from it. You get like chest pains because of anxiety you can get from it. You can feel short of breath from it. That's what I've noticed with me. Occasionally, I get headaches from it if I go too long, and then, too, there's different emotional things. Like I just become easily angry. Like I get a very, very short fuse a lot of times and just like with small stuff it just like sets me off and makes me angrier than it really should" (17 yr old white male).
"It's like a heavy burden is put on you, and the only way to get that rock off your back is to smoke a cigarette" (22 yr old white male).
"It's not a great feeling because it's like you feel like agitated, like annoyed, and you're just like, okay, I've got to go, I've got to go, I've got to go." "I'm feeling really irritable right now, agitated, annoyed, like any little thing really gets to you at this point" (36 yr old Hispanic female).

evolved in the order of wanting, craving, and needing. The one subject that reported that needing appeared before craving, repeatedly used the word 'needing' in a manner inconsistent with the definition provided.

For several subjects, the transition from wanting to craving prompted them to purchase their own cigarettes for the first time.

3.4. The order in which symptoms appeared during withdrawal

With only a few exceptions, subjects reported that during withdrawal under emotionally calm circumstances, symptoms appeared

in the order of wanting, craving and needing. "If the wanting goes long enough it turns into a craving" (31 yr old white female).

Interviewer: "Now currently, if you just wait without smoking, do the needing, wanting and craving appear in a certain order?"

Participant: "Wanting, then craving, and then needing."

Interviewer: "And just to recap, when you first started smoking, as you went along that progression, those three appeared in a specific order?"

Participant: "Yes, the same order ... wanting, then craving, and then needing. It's always in that order" (25 yr old white female).

A few subjects noted that if they were busy they might not notice the desire to smoke until craving interrupted their thoughts. A few subjects noted that earlier they would experience wanting as the first symptom of withdrawal but currently they "skip over" wanting and experience craving as the first indication of withdrawal. A 28 year old Hispanic male reported previously experiencing wanting, craving and needing in that order, "but like now it's just like you just need a cigarette. There's not any craving, it's just so ... it's so instantaneous right in your brain and there's no thinking about it."

3.5. Factors other than withdrawal that trigger similar symptoms

Subjects identified a number of internal and external factors other than withdrawal that can produce a desire to smoke. Subjects reported that a mild desire to smoke (similar to wanting) can be triggered by smoking cues in the environment such as seeing cigarettes, smelling cigarette smoke, or seeing someone else smoking. Other factors that trigger a mild desire to smoke include boredom, consuming alcohol, consuming coffee, excitement and stress. Common triggers for a strong desire to smoke (similar to craving) included the smell of smoke, boredom, stress, hunger, after a meal, after sex, and when drinking alcohol. An intense urge to smoke (similar to needing) can be triggered by stress and anger.

When asked about symptoms they experience because they have "gone too long without smoking," smokers readily distinguish wanting, craving and needing triggered by abstinence from the desire to smoke triggered by other factors. We identified the following features that distinguish the withdrawal symptoms of wanting, craving and needing, from similar experiences not caused by withdrawal.

3.5.1. Relief by smoking

Withdrawal symptoms are relieved promptly by smoking. While mild cue-induced urges to smoke are relieved by smoking, strong desires to smoke that are triggered by emotional distress or alcohol consumption may not be relieved by smoking. Even light smokers noted that they might chain smoke under these circumstances because smoking did not relieve the desire to smoke.

3.5.2. Characteristic sequence

Withdrawal symptoms appear in a characteristic sequence of wanting, craving and needing, or in heavier smokers, just craving and needing. The desire to smoke that is triggered by extraneous factors does not follow a sequence. A person might have just satisfied the need to smoke and a moment later experience an intense desire to smoke after receiving bad news.

3.5.3. Characteristic timing

Withdrawal symptoms appear with a delay (latency) after the last cigarette that is characteristic for each smoker such that the smoker can rely on smoking a cigarette to keep withdrawal symptoms at bay for a certain period of time (Ursprung et al., 2010). The desire

to smoke that is triggered by factors other than abstinence has no delay; it can emerge within moments of finishing a cigarette.

4. Discussion

Our first 50 case histories suggested that symptoms of withdrawal present in a set sequence over the clinical course: first wanting, then craving, and finally needing. Our 25 new cases support this developmental sequence. Additional support comes from a cross-sectional study of 349 adolescent smokers (DiFranza et al., 2011a). Subjects were asked about their recent experiences with wanting, craving and needing using the same operational definitions as the current study. Combinations of symptoms that were consistent with the sequence of wanting, craving and needing (i.e., wanting only, wanting and craving, or wanting, craving and needing) were reported by 99.4% of smokers. However, the current study was the first to ask smokers to describe the order in which these symptoms developed. Together, these three studies support the conclusion that these symptoms develop in the sequence described.

Subjects confirmed that the operational definitions for wanting, craving and needing were valid descriptions of symptoms they had experienced during withdrawal. Four subjects had not experienced needing, and we attribute this to their being at a less advanced stage of addiction (DiFranza et al., 2011a).

Our first case series suggested that the symptoms of wanting, craving and needing appear in this order during each episode of abstinence. The current study provides the first confirmation of this observation and provides new insights. A few subjects indicated that earlier in their smoking career they had experienced wanting, craving and needing in sequence, but more recently the urge to smoke skipped over wanting and started with craving, or skipped over both wanting and craving, and started directly with needing. We speculate that skipping over the earlier symptoms may be an indication of more advanced addiction. This hypothesis could be evaluated in future studies.

The idea that the qualitative differences between wanting, craving and needing represent progressive stages in the development of addiction is strongly supported by the previously mentioned study of adolescents, and by a cross sectional study of 422 adult smokers in which it was demonstrated that higher stages of wanting, craving and needing were associated with higher values on 40 separate indicators of tobacco addiction (DiFranza et al., 2011b).

We found three features that distinguish the desire to smoke that is triggered by abstinence from the desire to smoke triggered by stress. Stress-induced urges to smoke are not relieved by smoking, do not follow a characteristic sequence, and are not governed by a latency. Together with wanting, craving and needing, our case histories identified four qualitatively distinct symptoms that would not be distinguished by existing measures of craving used in smoking research (Cox et al., 2001; Singleton et al., 2003). Our use of specific operational definitions, as recommended by Kozlowski, was essential in this regard.

A limitation of our study is that we did not ask about withdrawal symptoms other than the desire to smoke. Our study of 422 adult

smokers found no indication that other withdrawal symptoms such as irritability, restlessness, anxiety, impatience, or short temper follow any similar developmental sequence (DiFranza et al., 2011b). Additional study limitations include a small sample size, limited racial and ethnic diversity, the use of a convenience sample, and retrospective data collection. Our subjects all experienced withdrawal symptoms frequently so they were not required to recall rare and remote events. Recollection of the order of symptom development did require longer recall, but the average age of our sample was only 24.5 years. Most subjects had little difficulty remembering the order of symptom presentation as the transitions from wanting to craving to needing were typically separated by many months or years. Additionally, we employed interview techniques that assist recall by prompting subjects to recall the details of events to place them within the context of their lives.

5. Conclusion

The current study provides support for the following observations: (1) abstinence from tobacco provokes characteristic symptoms of wanting, craving and needing that are widely endorsed by smokers as symptoms they have experienced; (2) these symptoms develop in a set sequence of wanting, craving and needing in all, or nearly all, smokers over their clinical course; (3) these symptoms recur in the same sequence during episodes of abstinence; (4) stress-induced urges to smoke are not relieved by smoking, do not follow a characteristic sequence, and do not have a latency. This clinical evidence suggests that smokers share a common experience that should allow physicians to diagnose physical dependence based upon recognition of these withdrawal symptoms.

References

- Cox L, Tiffany S, Christen A. Evaluation of the brief questionnaire of smoking urges (QSU-brief) in laboratory and clinical settings. *Nicotine Tob Res* 2001;3:7-16.
- DiFranza J, Wellman R, Ursprung S, Sabiston C. The Autonomy Over Smoking Scale. *Psychol Addict Behav* 2009;23:656-65.
- DiFranza J, Ursprung W, Carlson A. New insights into the compulsion to use tobacco from a case series. *J Adolesc* 2010;33:209-14.
- DiFranza J, Sweet M, Savageau J, Ursprung W. An evaluation of a clinical approach to staging tobacco addiction. *J Pediatr* 2011a:In press.
- DiFranza J, Wellman R, Savageau J. Does progression through the stages of physical addiction indicate increasing overall addiction to tobacco? *Psychopharmacology (Berl)* 2011b. Online at 10.1007/s00213-011-2411-4.
- Kozlowski LT, Wilkinson DA. Use and misuse of the concept of craving by alcohol, tobacco, and drug researchers. *Br J Addict* 1987;82:31-45.
- Kozlowski LT, Mann RE, Wilkinson DA, Poulos CX. "Cravings" are ambiguous: ask about urges or desires. *Addict Behav* 1989;14:443-5.
- Singleton EG, Anderson LM, Heishman SJ. Reliability and validity of the Tobacco Craving Questionnaire and validation of a craving-induction procedure using multiple measures of craving and mood. *Addiction* 2003;98:1537-46.
- Ursprung S, Morello P, Gershenson B, DiFranza J. Development of a measure of the latency to needing a cigarette. *J Adolesc Health* 2010;48:338-43.
- Wellman R, DiFranza J, Savageau J, Godiwala S, Friedman K, Hazelton J. Measuring adults' loss of autonomy over nicotine use: the Hooked on Nicotine Checklist. *Nicotine Tob Res* 2005;7:157-61.
- Yin R. Case series research design and methods. 4 ed. Thousand Oaks, California: Sage; 2009.