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Usefulness of the CRAFFT to Diagnose Alcohol or Cannabis Use Disorders in a Sample of Emerging Adults with Past-Month Alcohol or Cannabis Use

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Background

Emerging adults, ages 18–25 years old, report higher rates of illicit drug use and heavy alcohol use than any other age group and have higher rates of alcohol and substance use disorders. (SAMHSA, 2014) Nineteen percent of individuals in this age group report current cannabis use, compared to 7.1% of 12–17 year olds and 5.6% of individuals 26 years old. (SAMHSA, 2014) Thirty-eight percent report binge drinking compared to 6.2% of 12–17 year olds. Binge drinking peaks between 21–25 years of age at 43.3%; which is higher than any other age group. (SAMHSA, 2014)

Emerging adulthood represents a developmental stage between adolescence and young adulthood. (Arnett, 2000) The unique features of emerging adulthood as proposed by Arnett -- a time of identity exploration, instability, and life transition -- may explain why alcohol and drug use is higher during this period. For example, as part of identity exploration, emerging adults may seek a wide range of experiences that could include using substances more frequently and in greater quantities. In addition, although some of the risk factors for substance use and misuse overlap between adolescents and emerging adults, some are distinct such as increased freedom and less monitoring from parents. (Stone, Becker, Huber, & Catalano, 2012) As a result, prior work with emerging adults has hypothesized that the unique features of emerging adulthood require a tailored approach to address this period of increased alcohol and drug use. (D. C. Smith, Godley, Godley, & Dennis, 2011)

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Despite this, a need exists to determine whether alcohol and substance use screening and assessment tools validated for other age groups are applicable for this age group. (Conrad, Dennis, Bezruczko, Funk, & Riley, 2007; D. C. Smith, Bahar, Cleeland, & Davis, 2014) Initial studies focused on emerging adults have demonstrated test characteristics as well as interventions for substance use disorders may perform differently in this age group, however, the evidence base is just emerging and the need for further empirical research to prove this remains. (Kelly, Donovan, Chung, Bukstein, & Cornelius, 2009; Kelly, Donovan, Chung, Cook, & Delbridge, 2004; D. C. Smith et al., 2011; Sussman & Arnett, 2014)

For clinicians treating adult patients, a single-item screening question about substance use is a common first step of evaluation. One example of a validated single item screen for problematic alcohol use is to ask, “How many times in the past year have you had X or more drinks in a day?” where X is 4 drinks for women and 5 drinks for men. (P. C. Smith, Schmidt, Allensworth-Davies, & Saitz, 2009) A similar validated single-item screen for drug use, “How many times in the past year have you used an illegal drug or used a prescription medication for non-medical reasons?” has also been evaluated. (P. C. Smith, Schmidt, Allensworth-Davies, & Saitz, 2010) A positive response to either question prompts further assessment to determine the extent of a potential alcohol or substance use problem. Because the majority of emerging adults drink or use cannabis; a ‘second level’ evaluation for those who report use on a single-question screener is useful to direct patients to appropriate intervention options. (SAMHSA, 2014) Various brief “second level” screeners, or assessment tools exist, however the optimal tool for such an assessment in this age group has not been determined. (Kelly et al., 2009; Kelly et al., 2004; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993)

The CRAFFT instrument, which has been used as a “second level” screener, includes 6 questions that assess domains affected by substance use (Car, Relax, Alone, Friends/family, Forget and Trouble). Developed and validated as a clinical assessment tool for adolescents between the ages of 14–18, the CRAFFT distinguishes between high risk and low risk substance use in adolescents *who reported past year use*. (Knight, Sherritt, Harris, Gates, & Chang, 2003; Knight, Sherritt, Shrier, Harris, & Chang, 2002) At a cut-off score of 2, the CRAFFT has 92% sensitivity and 80% specificity in identifying DSM-IV drug or alcohol dependence. A recent study found that a cut-off of 2 continues to be sensitive and specific for identifying drug and alcohol use disorders using DSM-V criteria in 14–18 year olds. (Mitchell et al., 2014) Two other ‘second level’ screener studies of 18–20 year-olds seeking emergency room care and admitting to recent alcohol use found the CRAFFT had 94–95% sensitivity and 44–49% specificity, using the cut-off score of 2, for diagnosing an alcohol use disorder based on the DSM-IV definitions of abuse and dependence. (Kelly et al., 2009; Kelly et al., 2004) but these studies did not report test characteristics for cannabis use.

Because of the high prevalence of alcohol and cannabis use in emerging adults, the paucity of studies examining how test characteristics may vary in this age group, and the possibility that identification with a mild, moderate or severe substance use disorder may lead to different clinical interventions, our objectives are to expand previous work by 1) administering the CRAFFT as a ‘second level’ assessment tool to 18–25 year olds, a group that has not been previously included in CRAFFT studies and has higher prevalence of

substance use than adolescents, 2) examining the CRAFFT's test characteristics in determining cannabis use disorders as well as alcohol use disorders and stratifying by mild, moderate and severe disorders, 3) using DSM V rather than DSM IV for substance use disorder determinations, and 4) focusing on emerging adults who report last month alcohol or cannabis use rather than last year use. These objectives will help determine whether the CRAFFT could be useful as a brief assessment for emerging adults.

Methods

Participants

Participants were recruited between January 2012 and July 2013 for a study of behavioral risks among emerging adults. As previously described, recruitment targeted southern New England through advertisements (Men and Women between 18 and 25: Have you recently used marijuana or alcohol? You may be eligible to participate in a research study about the health behaviors of young adults") placed online, on public transportation, and on commercial radio. Interested individuals contacted study staff and were given a 10-minute anonymous phone screen that included demographic characteristics, substance use, sexual activity, mental health, and general health.(Tzilos, Reddy, Caviness, Anderson, & Stein, 2014) Eligible individuals were invited for an in-person interview and offered compensation (\$40) and free sexually transmitted infection testing. The study was approved by the Butler Hospital Institutional Review Board.

Eligibility criteria included being 18–25 years old, drinking alcohol and/or using MJ in the last month, not having suicidal ideation in the past two weeks, and living within 30 minutes of the research site. Of the 1621 individuals screened by phone, 689 were ineligible. The most common reasons for ineligibility were an age outside the target range, having suicidal ideation, and living at a distance from the research site. The remaining 932 eligible persons were invited for an interview and 533 were either not interested or did not keep a scheduled baseline appointment. Participants who enrolled did not differ significantly from those eligible persons who did not enroll with respect to age ($p = .74$) or ethnicity ($p = .31$), but females (30.5%) were significantly ($p = .004$) more likely to keep their baseline appointment than males (23.4%). Three hundred ninety-nine individuals completed baseline interviews after which 17 persons were found to be ineligible, leaving a final sample of 382.

MEASURES

Structured Interview for the DSM-IV—(First, Spitzer, Gibbon, & Williams, 1996):

Since this study predated the distribution of DSM V, to determine DSM-V defined cannabis and alcohol use disorders, we supplemented the SCID DSM-IV cannabis and alcohol abuse and dependence items with questions regarding cravings/desires. We asked all participants, "In the past 3 months, have you often had cravings or strong desires or urges to use cannabis (alcohol)?" Participants endorsing two or more use disorder criteria, including our additional question regarding cravings/desires, met criteria for DSM-5 substance use disorder. As recommended by Hasin and colleagues(Hasin et al., 2013) and consistent with how severity is determined by the DSM-5, we coded severity of cannabis use and alcohol use disorder according to number of the 11 DSM-5 criteria endorsed, as follows: No disorder = 0 or 1

symptoms, Mild = 2 or 3 symptoms, Moderate = 4 or 5 symptoms, and Severe = 6 or more symptoms.

CRAFFT—The CRAFFT instrument includes six questions requiring yes/no responses: (Knight et al., 2002)

1. Have you ever ridden in a car driven by someone (including yourself) who was “high” or had been using alcohol or cannabis? (CAR)
2. Do you ever use alcohol or cannabis to relax, feel better about yourself, or fit in? (RELAX)
3. Do you ever use alcohol or cannabis while you are by yourself? (ALONE)
4. Do your family or friends ever tell you that you should cut down on your alcohol or cannabis use? (FAMILY/FRIENDS)
5. Do you ever forget things you did while using alcohol or cannabis? (FORGET)
6. Have you ever gotten into trouble while you were using alcohol or cannabis? (TROUBLE)

Analysis

We present descriptive statistics to summarize sample characteristics. To evaluate the utility of the CRAFFT for identifying persons with alcohol or cannabis use disorder, we report the sensitivity (% true positives correctly identified), specificity (% true negatives correctly identified), and the area under the receiver operating characteristic curve (AROC) at a range of possible cut scores. In order to address substance use severity, we conducted separate analyses to evaluate the utility of the CRAFFT to identify persons with mild or more severe disorders, and those with moderate or more severe disorders.

Results

Demographics

Participants averaged 21.9 ($\pm$ 2.1) years of age, 180 (47.1%) were male, 247 (64.6%) were non-Latino Caucasian, 45 (11.8%) were non-Latino African-American, 47 (12.3%) were Latino, and 43 (11.7%) were of multiple or other racial or ethnic origins. Of the 382 subjects, 313 (82%) were employed and/or enrolled in school and 69 (18%) were neither enrolled in school nor currently employed.

Prevalence of Alcohol and Cannabis Use Disorders

Of the 382 subjects, two hundred forty two persons (63.5%) met criteria for either alcohol or cannabis use disorder. Ninety-one (23.8%) persons met criteria for both alcohol and cannabis disorders. Eighty-seven (23%) met criteria for a mild alcohol use disorder, 56 (15%) for moderate alcohol use disorder, and 18 (5%) for severe alcohol use disorder. Eighty-one persons (21%) met criteria for mild cannabis use disorder, 49 (13%) for moderate cannabis use disorder and 42 (11%) for severe cannabis use disorder.

CRAFFT Scores

The mean CRAFFT score was 3.97 (SD = 1.50; Median = 4.00). Sixty-five percent of subjects had a score ≥ 4 . Of the total 382 subjects, 328 (86%) responded “yes” to the CAR question; 325 (85%) responded “yes” to the RELAX question; 297 (78%) responded “yes” to the ALONE question; 161 (42%) responded “yes” to the FAMILY/FRIENDS question; 271 (71%) responded “yes” to the FORGET question; and 135 (35%) responded “yes” to the TROUBLE question.

Optimal Cut Scores for Predicting Alcohol or Cannabis Use Disorders

Table 1 presents data on the sensitivity and specificity of the CRAFFT to predict mild or more severe alcohol or cannabis use disorders individually or in combination. Maximum overall predictive accuracy, as assessed by the area under the receiver operating characteristic curve (AROC) was .71 at a cut score of 4 or higher when predicting either any alcohol use disorder or any cannabis use disorder. Maximum overall predictive accuracy, as assessed by the area under the receiver operating characteristic curve (AROC) was .63 at a cut score of 4 or higher when predicting any alcohol use disorder and .70 at a cut score of 5 or higher when predicting any cannabis use disorder. At a cut score of 4, sensitivity was 81.4% and 83.7% when predicting mild or more severe alcohol or cannabis use disorders, respectively, but specificity was only 45.3% for alcohol use disorder and 48.6% for cannabis use disorder at that cut score. At a cut score of 5 or higher, sensitivity and specificity both exceeded 50% though sensitivity was reduced when considering each substance alone.

We also examined sensitivity and specificity to predict moderate or more severe disorders. At a cut score ≥ 4 sensitivity and specificity were 84.1% and 44.3%, respectively, when predicting moderate or more severe alcohol or cannabis use disorders. At a cut score ≥ 5 sensitivity and specificity were 85.1% and 61.4%, respectively, when predicting moderate or more severe alcohol use disorders. And at the same cut score sensitivity was 67.0% and specificity was 65.6% when predicting moderate or more severe cannabis use disorder. Higher or lower cut scores yielded sensitivity or specificity estimates $< 50\%$ when predicting either alcohol or cannabis disorders at moderate or more severe levels. Across nearly all cut scores for both substances, the CRAFFT had a higher sensitivity and lower specificity for moderate or severe use disorder than for mild use disorder.

Discussion

Given the high prevalence of alcohol and cannabis use in emerging adults ("Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Web-based Injury Statistics Query and Reporting System (WISQARS) [online].," 2005; Hingson, Heeren, Edwards, & Saitz, 2012; SAMHSA, 2014), once substance use is identified, providers must assess the clinical severity. We recruited emerging adults who had reported last month alcohol and/or cannabis use; that is, they had already “screened” positive using a single question for recent use. As part of the baseline assessment, we used the CRAFFT as a ‘second-level’ assessment for determining whether these alcohol and cannabis users report specific substance-related problems that might be associated with substance use disorder diagnoses.

Previous investigations with adolescents in hospital-based primary care settings have found a cut score of 2 for the CRAFFT provided adequate sensitivity and specificity for identifying persons with substance use disorder. (Knight et al., 2003; Knight et al., 2002) In this sample of emerging adults who used alcohol or cannabis, we found that a cut-off point of 2 had insufficient specificity. A cut off point of 4 provided a more heuristically useful balance of sensitivity and specificity in this sample of substance users and had moderate test characteristics for identifying either alcohol or cannabis use disorders (across all severity levels). Since this study was conducted in a sample of emerging adults already using either alcohol or marijuana, the goal would be to use an instrument with high specificity; still, using cut-off of 4 or higher or even 5 or higher produced relatively low specificity. This is similar to other studies of detecting alcohol use disorders in emerging adults with the CRAFFT. (Kelly et al., 2009; Kelly et al., 2004)

One possibility for the CRAFFT's low specificity (high false positive rate) in multiple studies of emerging adults relates to the individual domains that the CRAFFT queries. The domains that the CRAFFT addresses, such as using to relax, using to forget, getting in trouble, may be answered positively but do not require that the individual has an alcohol or cannabis use disorder. As emerging adults transition between leaving home and finding the stability of young adulthood, their lives may be highly unstable, and alcohol or cannabis may be a way to help them "Relax" or "Forget." In addition, emerging adulthood is a time of experience or sensation seeking (such as driving while intoxicated) that may lead to "Trouble". However, even though alcohol or cannabis use are not the optimal way to manage these obstacles, the sporadic use of either, and therefore positive responses to the CRAFFT, may not represent a use disorder but rather serve as a reflection of developmental life stage. If this is true, then second level assessment tools for emerging adults designed to capture severity should contain questions that more closely correlate with the DSM-V criteria for alcohol and substance use disorders. Such questions would have to be tested in future research but could include probing about use in hazardous situations and impact on social activities. For example, the CRAFFT asks about getting into trouble related to alcohol or drug use, however, it is possible that trouble does not accurately capture the DSM-V criteria of use in physically hazardous situations or as impacting on important activities. One option would be to replace the "trouble" question, with "Have you ever used alcohol or drugs in situations where you could have gotten hurt?" and/or "Has your alcohol or drug use caused job troubles or school problems?"

There are limitations to this study. It was conducted in a sample of emerging adults recruited through advertisement for recent cannabis or alcohol use to a research setting and who reported a higher baseline prevalence of cannabis and alcohol use disorders than would likely be seen in primary care populations where the spectrum of disease is likely to be less severe. As all participants reported past month alcohol and/or marijuana use, this may limit the generalizability of these findings to general medical settings or the general population where recent substance use is not universal. Sensitivity and specificity are usually not thought to be influenced by disease prevalence, however, some recent studies have shown that higher disease prevalence can be associated with lower specificity- this could explain our findings but also limit the context within which using the CRAFFT is clinically useful. (Leeftang, Rutjes, Reitsma, Hooft, & Bossuyt, 2013) An additional limitation of the

CRAFFT questions is that by asking about both alcohol and cannabis simultaneously, these emerging adults did not have to specify the substance in each of the six instrument questions. Asking about specific substances, such as opioids or cocaine, when administering the CRAFFT would likely enhance predictive utility to identify specific substance disorders. In addition, the CRAFFT's time frame refers to "ever" use; in order to identify current substance use disorders it may be more relevant to ask young adults about substance use in the past month or year. Because we were interested in how the CRAFFT functioned as an assessment tool, we did not compare it with screening tools, such as the AUDIT, the AUDIT-C, or the RUFT-Cut. Finally, the CRAFFT does not capture data on other drugs used such as opioids or stimulants.

The CRAFFT can identify an alcohol or cannabis use disorder for emerging adults who screen positive for recent alcohol and/or cannabis use, but its test characteristics are suboptimal due to low specificity. Based on our findings, the CRAFFT would have limited usefulness in this population. Future work should continue to focus on this understudied population of emerging adults who use alcohol and cannabis to determine the optimal, developmentally appropriate 'second level' alcohol and drug assessment tools for them.

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Table 1

Sensitivity and Specificity of the CRAFFT to Predict Any Substance Use Disorder, Alcohol Use Disorder or Cannabis Use Disorder and Moderate to Severe Substance Use Disorder, Alcohol Use Disorder or Cannabis Use Disorders (n = 382).

ALCOHOL OR CANNABIS ^a USE DISORDER							MOD-SEV SUBSTANCE ^a DISORDER		
Cut Score	Sens. %	Spec. %	AROC	Sens. %	Spec. %	AROC	Sens. %	Spec. %	AROC
1	100.0	3.6	0.52	100.0	2.1	0.51			
2	97.5	18.6	0.58	98.6	12.3	0.55			
3	93.8	35.7	0.65	96.4	24.6	0.60			
4	81.4	60.7	0.71	84.1	44.3	0.64			
5	56.6	82.6	0.70	58.7	67.2	0.63			
6	21.9	95.0	0.58	29.7	92.2	0.61			
ALCOHOL USE DISORDER							MOD-SEV ALCOHOL DISORDER		
Cut Score	Sens. %	Spec. %	AROC	Sens. %	Spec. %	AROC	Sens. %	Spec. %	AROC
1	100.0	2.3	0.51	100.0	1.6	0.51			
2	98.1	13.1	0.56	100.0	10.1	0.54			
3	92.6	24.0	0.58	98.7	20.5	0.59			
4	81.4	45.3	0.63	97.3	38.6	0.62			
5	54.7	67.0	0.61	85.1	61.4	0.59			
6	23.6	90.1	0.57	32.4	88.3	0.60			
CANNABIS USE DISORDER							MOD-SEV CANNABIS DISORDER		
Cut Score	Sens. %	Spec. %	AROC	Sens. %	Spec. %	AROC	Sens. %	Spec. %	AROC
1	100.0	2.4	0.51	100.0	1.7	0.51			
2	98.3	13.8	0.56	98.9	10.7	0.55			
3	96.5	28.1	0.62	95.6	21.0	0.58			
4	83.7	48.6	0.66	85.7	40.2	0.63			
5	64.0	75.7	0.70	67.0	65.6	0.66			
6	26.7	93.3	0.60	35.2	90.4	0.63			

^aMet criteria for either alcohol or cannabis use disorder.