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Endorsement of Specific Alcohol Use Disorders Criteria Items Changes with Age in Individuals with Persistent Alcohol Use Disorders in Two Generations of the San Diego Prospective Study

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Abstract

Background: Diagnostic and Statistical Manual (DSM) alcohol use disorder (AUD) criteria are written in broad enough terms to apply to diverse populations. The current analyses evaluate if the endorsement of criteria change with increasing age in individuals with persistent AUDs.

Methods: Data regarding AUDs persisting across three timepoints between average ages of 31 and 43 were gathered about every five years from 318 interviews for 106 San Diego Prospective Study (SDPS) AUD male probands. Similar data regarding persistent AUDs across two timepoints were obtained from 136 interviews with 68 SDPS AUD offspring between average ages of 21 and 27. Changes in endorsement of each AUD criterion were evaluated using Cochran's Q test.

Results: For AUD probands across time significant decreases were observed in the proportions endorsing four criteria (tolerance, withdrawal, failure to fulfill obligations, and using alcohol in hazardous situations). Increased rates of endorsement were documented for three criteria (drinking higher quantities or for longer periods of time, spending a great deal of time regarding alcohol, and continued use despite social or interpersonal problems). Significant increases in rates of endorsements for offspring were seen for spending a great deal of time regarding alcohol and giving up or reducing important activities in order to drink.

Conclusions: These data indicate that the salience of many DSM AUD criterion items changed significantly with age in both SDPS generations among individuals with persistent AUDs. The current results support the need for additional systematic research to determine whether specific criterion items might need to be weighted differently in evaluating older and younger individuals with persistent AUDs.

Keywords

Alcohol use disorder; dependence; abuse; geriatrics; diagnostic criteria

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Introduction

Diagnostic criteria for disorders are important for communication among clinicians, their ability to use the diagnosis to predict the likely clinical course, as a guide to selecting the most appropriate treatment, and diagnostic criteria are essential for accurately interpreting the research literature (Goodwin and Guze, 1996). To serve these and other purposes, the diagnostic guidelines must be optimally reliable and have well established prognostic validity. In the mental health field overall, reflecting the absence of definitive laboratory tests, the criteria are based on the pattern and time course of clinical signs and symptoms (American Psychiatric Association, 1994; World Health Organization, 1992). An additional challenge occurs in the field of substance use disorders (SUDs) where diagnostic criteria must be broad enough to be applicable to at least 10 different categories of types of drugs of misuse (Hasin et al., 2013; Schuckit and Saunders, 2006; Schuckit, 2013).

The criteria presented in the Diagnostic and Statistical Manuals (DSMs) of the American Psychiatric Association were primarily written for clinicians (Schuckit, 2013). As a result, to enhance their ease of use, diagnostic algorithms are broadly described to make them applicable to men and women, older and younger patients and clients, and individuals from diverse cultural backgrounds. Thus, the substance related problems are described in general terms in the DSMs, and it is recognized that it is unlikely that any single individual will fulfill all the signs and symptoms described in the manual.

The same broad language used to describe the 11 DSM-IV SUD criteria are applied to all drugs of abuse, including alcohol use disorders (AUDs), a step created so that clinicians only need to learn one diagnostic algorithm. However, that simplification contributes to the situation where the pattern of the specific criteria relevant to an individual might change as they grow older. This issue is particularly relevant to individuals with persistent AUDs, where different patterns of criteria endorsed might interfere with a clinician's ability to recognize continuing problematic alcohol use, or to identify AUDs in new patients and clients. These older heavier drinkers carry enhanced risks for serious substance-related consequences (Behrendt, 2019; Britton et al., 2015; Chagas et al., 2019; Grant et al., 2017; Han et al., 2019). Heavier drinking older individuals are more likely than younger to develop cardiovascular problems, they have higher cancer risks exacerbated by heavy drinking, are more likely to take medications that adversely interact with alcohol, and are more vulnerable to alcohol related falls, fatty liver disease, and other adverse effects of drinking (Boissoneault et al., 2014; Fat et al., 2020; Ferreira and Weems, 2008). Despite these enhanced dangers of heavier drinking, older individuals with AUDs are more challenging to identify in part because our understanding of the pattern of criteria likely to be seen as the individual in need of help for their drinking problems might not be the same as they get older. This process might in part relate to the fact that with increasing age a person with an AUD achieves higher blood alcohol levels with fewer drinks than younger individuals as a reflection of age-related lower levels of body water and slower alcohol metabolism (Li et al., 2006; Pozzato et al., 1995; Schuckit et al., 2004; Sorg et al., 2015).

However, few prospective studies have evaluated changes in rates of endorsement of specific AUD criteria as an individual with this disorder grows older. The course of repetitive

alcohol problems in AUDs tends to stretch over decades with fluctuations in intensity of alcohol intake and related problems (Goncalvez et al., 2017; Jacob et al., 2009; Schuckit et al., 2016; Sloan et al., 2011). In addition, a recent evaluation of the persistence of endorsement of specific AUD criteria over a three-year period in a general population sample of drinkers documented differences in the pattern of consistency of self-reports across older and younger adults (Verges et al., 2021). Clinicians as well as researchers face challenges in monitoring the course of alcohol problems in individuals with persistent AUDs or in identifying AUDs in older new patients who are presenting after years of alcohol problems. Studying the relationship of age to the pattern of endorsement of specific AUD criteria in any group is challenging for several reasons. The patterns observed could differ across different research instruments used to gather the data, different demographic groups and sexes, as well as whether the data are gathered from patient or community samples (Buu et al.,2012; Lane et al., 2016; Saha et al., 2006, 2020; Vize and Lane, 2021). While there are relatively few data regarding changes in which criteria are likely to be endorsed across age groups within the same individuals with AUDs, some information regarding this process might be gleaned from cross sectional and retrospective studies of drinking populations, investigations that ask different questions than the issues raised in the current analyses (e.g., Buu et al., 2012; Lane et al., 2016; Saha et al., 2006, 2020). One national study of drinking in the *general population* presented information regarding the proportion of drinkers from ages 12 to 55 who endorsed each of the 11 DSM-IV criterion items (Harford et al., 2005). Additional data came from the Collaborative Study of the Genetics of Alcoholism (COGA) protocol where retrospective reports of the approximate age of onset of the 11 DSM AUD criteria were recorded for 478 participants with alcohol dependence (Schuckit et al., 1995). An additional publication offered data from 17-year-old interviewed drinkers from treatment programs and respondents to advertisements who supplied retrospective information about the time between the onset of regular drinking and the development of each DSM problem (Martin et al.,1996).

There was general agreement across these and several additional studies from adult and the adolescent samples that the first dependence criterion, tolerance, noted here as D1, was likely to be seen relatively early in the course of drinking with less prevalent endorsement among older drinkers (Buu et al., 2012; Harford et al., 2005; Kandel et al., 2009; Marmet et al., 2019; Martin et al., 1995.1996; Schuckit et al., 1995). The opposite pattern might apply to the second dependence criterion item (D2), withdrawal, where studies indicated that withdrawal phenomena were relatively uncommon in adolescent drinkers, and were often reported among older individuals with AUDs, especially in those with comorbid medical problems (Harford et al., 2005; Martin et al., 1996; Schuckit 2009, 2014; Schuckit et al.,1995).

A third DSM AUD criterion often discussed in the literature relates to the use of alcohol in hazardous situations, the second DSM-IV abuse item (A2). This criterion has been criticized as having a relatively imprecise definition and a low relationship to the Item Response Theory (IRT) concept of severity (defined by the rate of endorsement of an item in a population) (Hasin et al., 2013; Martin et al., 2006; Mewton et al., 2014). Despite these caveats, in preparation for DSM-5, hazardous use was shown to add significant information to the latent concept of an AUD which was felt to justify maintaining this criterion from

DSM-IV. Focusing on the three studies highlighted above, all were consistent with relatively higher rates of this criterion in younger populations but lower rates of endorsement in older individuals (Harford et al., 2005; Martin et al., 1996; Schuckit et al., 1995) although not all other investigations agree (e.g., Marmet et al 2019).

In the current paper, information from the San Diego Prospective Study (SDPS) is used to ask a different question than those addressed in cross sectional and retrospective studies. We focus on the rates of endorsement of different AUD criteria items across time within the same individuals with persistent AUDs. The paper provides prospective data gathered with the same research instrument from the same population regarding how the pattern of endorsement of DSM AUD criteria changed over time within the male probands who developed AUDs in the course of the study and in the study's AUD male and female offspring. Our overarching Hypothesis 1 is that there will be significant changes over time in the pattern of endorsement of DSM-IV criterion items for AUDs which might indicate differences in the clinical relevance of specific criteria in different age groups of individuals with persistent AUDs. Hypothesis 2 states that endorsement rates for DSM items in participants with persistent AUDs will decrease over time for tolerance, criterion D1. Reflecting most reports in the literature and our own experience, Hypothesis 3 predicts that as adult probands with AUDs grow older endorsement over time will increase for withdrawal reflecting enhanced rates related to increasing medical problems with age. Also, based on the preponderance of the literature and the fact that risk taking, and impulsive behaviors decrease with age (e.g., Deakin et al., 2004; Green et al., 1996), Hypothesis 4 posits decreasing rates of drinking in hazardous situations (A2) as AUD probands and AUD offspring mature as they grow older. We do not propose formal hypotheses for additional criteria in part because of a paucity of data in the literature.

Methods

SDPS proband selection and evaluation

Between 1978 and 1988, after approval from the University of California, San Diego (UCSD) Institutional Review Board (IRB), questionnaires were mailed to random 18- to 25-year-old UCSD male students (Schuckit and Gold, 1988). That document queried potential interest in entering the research protocol and asked about experiences with alcohol and other drugs for themselves and their biological parents. Potential subjects were then interviewed in person using questions extracted from relevant sections of the Semi-Structured Assessment for the Genetics of Alcoholism (SSAGA) interview (validity, retest reliabilities, and cross-interviewer reliabilities of .7 to .8) (Bucholz et al.,1994; Hesselbrock et al.,1999). These items reviewed potential diagnoses based on the Third-Revised and Fourth Diagnostic and Statistical Manuals (DSM-IIIR and DSM-IV) (American Psychiatric Association, 1987, 1994). Individuals were selected for potential participation if they never met DSM-IIIR or DSM-IV criteria for an AUD, SUD, conduct disorder, bipolar disorder, or schizophrenia and did not currently have a major depressive or anxiety disorder (American Psychiatric Association, 1987, 1994; Schuckit and Gold, 1988). Individuals with an AUD father were then selected for baseline testing of their level of response to alcohol using an oral alcohol challenge, followed by selection of family history negative controls, with the

family history groups matched on recent drinking and drug use histories, demography, and height-to-weight ratios. As offspring of probands were born their birth was recorded and after reaching their 18th birthday the sons and daughters were interviewed and then followed using a SSAGA- based interview similar to the one used for the proband.

Follow-ups of probands and their offspring

Follow-up evaluations of SDPS participants were carried out about every 5 years with an interval-focused interview using questions derived from the SSAGA. The data gathered from probands and offspring included their alcohol, drug, and psychiatric diagnoses, as well as scores on the Impulsiveness Subscale of the Karolinska Scales of Personality and the Zuckerman Sensation Seeking Scale (Gustavsson et al., 2000; Schuckit et al., 2019; Schmidt et al., 2017). For alcohol and other substances of abuse the questions included past five-year experiences with each of the 11 DSM-IV SUD and AUD diagnostic criteria. While our analyses focused on DSM-IV, including criterion A3 (legal problems), almost identical criteria were used in DSM-IIIR in 1987 and DSM-5 in 2013 (American Psychiatric Association 1987, 2013).

To facilitate testing of the hypotheses listed above, the probands had to meet criteria for an AUD during the five-years before each of three follow-ups. The earliest evaluation of the three relevant time frames was always selected as Time 1, the next follow-up with an AUD present was treated as Time 2, and so on for Time 3. While the probands were followed for three evaluations with AUDs, the offspring were only followed from average ages of 18 to about age 30, and few offspring could have experienced three follow-ups. Therefore, data are presented for sons and daughters with two interviews during which they fulfilled AUD criteria.

Data Analyses

Data were available from 318 follow-up interviews with 106 probands with ongoing AUDs over an average of 12 years between ages 31 and 43 that included at least three separate AUD follow-ups. Information was also available from 136 interviews with 68 male (71%) and female offspring with ongoing AUDs over an average of six years between mean ages of 21 and 27 that included at least two separate AUD follow-ups. In these analyses 35 families had one offspring, 12 families had two, and three families contributed three siblings to the data. This report emphasizes data from the probands because of their larger sample size and the availability of data from three timepoints. Similar data are presented for offspring but the statistical analyses of those results with a smaller sample and limited timepoints are likely to represent more preliminary results.

Changes in rates of endorsement for each criterion for probands as presented in Table 2 were evaluated by an overall Standard Test Statistic Using Related Samples Cochran’s Q Test which, if significant, was followed by pairwise comparisons. Analysis within each criterion included Bonferroni corrections. For Table 3 for offspring, the relevant two groups were evaluated by the Standardized Test Statistic Using Related Samples Cochran’s Q Test.

Results

The current data were gathered prospectively through interviews conducted about every 5-years with SDPS probands and offspring who met criteria for DSM-IV AUDs in multiple follow-up intervals. The emphasis of these analyses is on the probands reflecting their larger number of subjects and longer period of evaluation compared to the offspring. The probands entered the study at about age 20 as men who had experience with alcohol but had not yet developed an AUD, with follow-ups carried out at approximately ages 30, 35, 40, 45, 50, and 55. Data on the smaller sample in the second generation are offered to give a more preliminary idea of changes in endorsement of the DSM criteria across an earlier life epoch.

As shown in the first data column of Table 1, data were gathered from the predominantly European American male probands at the time of their first interview after the onset of their AUD. These results demonstrated that about half had ever been married, they reported an average 17 years of education, and, reflecting the original study criteria, 69% reported a parent with an AUD. Among these probands, during the follow-ups 62% met criteria for alcohol dependence (with the remainder solely meeting criteria for alcohol abuse), with rates of dependence for probands of 62.3% at Time 1, 51.9% at Time 2 and 63.2% at Time 3 (z-score statistical analyses of Time 1 with 2 [$z=1.53$, $p=.13$], Time 1 with 3 [$z=-0.04$, $p=.89$], and Times 2 with 3 [$z=-1.66$, $p=.10$]). Over the five prior years they reported an average of 14 maximum standard (10–12 grams of ethanol) drinks per occasion endorsing on average 3.7 of the 11 AUD criterion items. Additional recent five-year characteristics included 81% who had used cannabis with 21% meeting criteria for a recent cannabis use disorder, and 63% who had ever used additional illicit drugs, including 24% who met criteria for SUDs on those substances. The table also lists the scores for impulsivity and sensation seeking.

The second data column of Table 1 reports descriptive data from the male and female AUD offspring. At the time of their first AUD interview, these younger subjects reported an average of 13 years of education, 56% met dependence criteria (44% had alcohol abuse) at their first AUD interview, and in the prior five years they reported on average a maximum of 15 standard drinks per occasion and endorsed on average 3.3 alcohol problems. For these SDPS offspring, 55.5% met criteria for dependence at Time 1 and 66.2% at Time 2 ($z=-1.23$, $p=.22$). Few members of this younger generation smoked, most had used illicit drugs (especially cannabis), 40% fulfilled criteria for a cannabis use disorder, and 18% met criteria for an SUD on another illicit substance.

Table 2 describes the AUD probands' patterns of endorsement of each of the 11 DSM-IV AUD criteria across three evaluations during which these men qualified for an AUD diagnosis. As shown in the first data column, at the time of their first follow-up where they met criteria for an AUD (Time 1) the probands had an average age of 31 and the average rate of endorsement across the 11 DSM-IV AUD criteria was 33.5%. The average rates of endorsement for each criterion ranged from a high of 77% for abuse item 2 (A2-use in hazardous situations) to a low of 10% for giving up important activities due to alcohol (D6). Listed in their order of decreasing proportions of endorsement after A2 were 63% each with tolerance (D1) and/or drinking alcohol in higher amounts or for longer periods of time than

planned (D3); 53% reporting failing to complete obligations because of drinking (A1); and 36% with a persistent desire or inability to decrease or stop drinking (D4). The remaining items were each endorsed by 15% or fewer of these subjects.

The third data column in Table 2 presents the rates of endorsement for each DSM-IV AUD criterion in these same probands at the time of the third period in which AUD criteria were fulfilled at an average age of 43. At that time, the average rate of endorsement across all 11 criteria was 27.7%, a value that was not significantly different from the average noted at Time 1 ($z=-1.30$, $p=.23$). Endorsement rates at Time 3 ranged from a high of 69% for drinking alcohol in higher amounts or for longer periods of time than planned (D3) to a low of 6% for both withdrawal (D2) and alcohol-related legal problems (A3).

As noted in the overall statistical analysis column of Table 2, significant decreases over time in the proportions of endorsement were observed for four criteria: tolerance (D1), withdrawal (D2), failure to meet important obligations (A1), and drinking in hazardous situations (A2). During that same period, rates of endorsement increased for three criteria including drinking alcohol in higher amounts or for longer periods of time than intended (D3); spending a great deal of time obtaining, using or recovering from the effects of alcohol (D5); and continued use despite alcohol related social or interpersonal problems (A4).

Reflecting the facts that the SDPS probands entered the study at about age 20 as drinkers who had not yet fulfilled criteria for an AUD and that the first follow-up did not occur until about age 30, the analyses in Table 2 do not offer information about the pattern of endorsement of specific DSM-IV criteria before age 30. Preliminary prospective data on earlier changes in DSM criteria endorsement among individuals with AUDs at multiple timepoints are available on another, smaller sample, the offspring with persistent AUDs from SDPS families. Table 3 presents the changes over time in rates of endorsement of DSM-IV AUD criteria as gathered from 136 interviews with the 68 AUD offspring who fulfilled criteria for AUDs in the 5-years before at least two follow-up interviews. At Time 1 (mean age 21) the average percent of endorsement across the 11 criteria was 30%, a figure that increased to 36% at Time 2 (mean age 27) ($z=1.65$, $p=.14$). For these young adults with two or more interview periods with AUD diagnoses, at Time 1 the proportions of endorsement across the criteria ranged from 65% for drinking higher amounts or for longer periods than planned (D3) to a low of 3% for withdrawal (D2). The other more often endorsed criteria after D3, in decreasing order, included 54% with tolerance (D1), 46% each for drinking associated with failed obligations (A1) and using alcohol in hazardous situations (A2); 41% reporting using a great deal of time to obtain, use, or recover from the effects of alcohol (D5); and 24% reporting continuing to use alcohol despite social and/or interpersonal problems (A4). -The remaining criteria were endorsed in less than 20% of the offspring. As shown in the last column of the table, the change in proportions endorsing each criterion was significant for two items: increased proportions reporting spending a great deal of time obtaining, using, or recovering from the effects of alcohol (D5), and reporting giving up important activities due to drinking (D6). The decreases over time for tolerance and for continuing to drink despite social or interpersonal problems were not significant (p-values of .12 and .11, respectively). Recognizing the potential impact of non-independence from multiple offspring in some families, the data in Table 3 were re-evaluated using only the

oldest offspring per family (N=50). The patterns of these results were identical to the data presented in Table 3 regarding the direction of change observed including, regarding significant items, the increase across Time 1 to Time 2 for D4 which went from a trend to significance (12.0 to 28.0, p<.05), the increase in D5 remaining significant (38.0 to 74.0, p<.001), and the increase in D6 becoming a trend (14.0 to 28.0, p=.09).

One problem with the DSM-IV definition of AUDs is the fact that abuse can be established with endorsement of only one AUD criterion. That is a problematical approach to diagnosing any syndrome and is likely to be associated with lower predictive validity. Thus, the analyses in Tables 2 were reevaluated for the 60 probands who reported at least two of the 11 criteria for each of the three AUD periods. The results were identical to those reported in Table 2 regarding the direction of change over time, with only withdrawal losing significance, where the nonsignificant change was from 13.3% at Time 1, to 5.0% Time 2 and 10.0% Time 3. A similar reevaluation was carried out for 55 offspring from Table 3 who endorsed at least two AUD criteria. Once again the results were identical to those in Table 3 regarding the direction of change over time, significance remained for the increases over time for much time spent (D5) and giving up activities (D6), and in addition the decrease in tolerance became significant in this smaller sample (65.5% to 41.8%, Cochran's Q Test −6.26, p<.05).

Discussion

Consistent with the overarching Hypothesis 1, significant changes over time in endorsement of AUD criterion items for probands with persistent AUDs were documented for seven of the 11 criteria. Data at younger ages and over a shorter timeframe from the AUD offspring also supported Hypothesis 1. These results indicate that clinicians and researchers should give adequate consideration to which AUD criteria might be most salient in identifying older versus younger drinkers with persistent problems who might benefit from interventions and treatment. The need to consider changes in endorsement patterns of specific items in different age groups could also be important for future iterations of the DSM. The specific criterion items that change with time might be different in different populations, a question that requires further research. However, the current prospective findings across two generations of the SDPS using the same diagnostic instrument and led by the same research team indicate that the changes observed here are not likely to be an artifact of the measures used and support for Hypothesis 1 is likely to be observed in other populations as well.

As predicted in Hypothesis 2, the prospective SDPS data revealed a decreased prevalence of endorsement of tolerance over time among probands with persistent AUDs. AUD offspring demonstrated a non-significant overall pattern (p=.12) for decreased endorsement of this criterion over time. The pattern of decreases in tolerance over time among individuals with AUDs is consistent with several cross sectional and retrospective investigations in the literature (e.g., Harford et al., 2005; Kandel et al., 2009; Martin et al., 1996; Schuckit et al., 1995). One possible explanation for this decreased endorsement with increasing age might reflect how tolerance is likely to be defined in research and clinical situations where the emphasis is usually on a recent time frame (e.g., past year or past 5-years). Tolerance might have occurred earlier in the drinking career and been relatively constant throughout

the heavy drinking years with the result that an individual with an AUD might indicate that tolerance, while technically present, was not newly observed in the more recent past. Another potential contributor to decreased acknowledgment of D1 over time is the fact that at older ages drinkers are likely to actually increase their intensity of reaction to alcohol because they experience higher blood alcohol levels per drink as a consequence of: 1) slower oxidation of ethanol in the liver; 2) lower body water with age related to decreased water-rich body muscle; and 3) age-related increased GABA sensitivity (Li et al., 2006; Pozzato et al., 1995; Schuckit et al., 2004; Sorg et al., 2015).

However, Hypothesis 3 regarding a potential increase with age in endorsement of the criterion of withdrawal was not supported in these analyses where probands with persistent AUDs demonstrated a significant decrease, rather than an increase, in self-reported symptoms of withdrawal between ages 31 and 43. The data in the younger SDPS generation showed little change in the endorsement of D2 over time. Hypothesis 3 might be more relevant to individuals with AUDs in their 50s and/or those with more medical problems compared to SDPS participants (Schuckit, 2009, 2014). However, the current results were similar to those of the cross-sectional general population survey by Harford et al (2005) that suggested that rates of self-reported withdrawal phenomena did not change dramatically during mid-life.

Hypothesis 4 predicted age-related decreasing rates of endorsement of criterion A2 that related to using alcohol in hazardous situations. Consistent with this projection, our prospective data for probands with persistent AUDs documented significant decreases in endorsement rates for A2 over time, perhaps as a consequence of decreases in most risky behaviors with increasing age (e.g., Deakin et al., 2004). The SDPS offspring with persistent AUDs demonstrated non-significant decreases in endorsement of A2 over time. Hypothesis 4 is consistent with the potentially normal distribution of the age of endorsement of this item in the general population cross-sectional study, although the adolescent data indicated no change in endorsement of hazardous use (Harford et al., 2005; Martin et al., 1996).

Except for the specific criterion items described immediately above, our group did not believe there was sufficient evidence in the prior literature to support specific hypotheses for changes in rates of endorsement for the remaining AUD criterion items in individuals with persistent AUDs. However, the current data indicated that endorsement of spending a great deal of time involved with alcohol (D5) increased significantly over time in both generations of SDPS participants with persistent AUDs. Two additional DSM criteria demonstrated significant increases of endorsements in probands with a similar (but non-significant) direction of change in offspring. These included drinking higher alcohol quantities or for longer periods than intended (D3) and continued drinking despite social or interpersonal problems (A4). The non-significant results in offspring might reflect the limitation of analyses to two time points and the smaller sample in the younger generation.

The final significant change in endorsements over time for probands involved decreases in A1 regarding failure to fulfill obligations because of alcohol, but no change in rates of reports of this item was noted for offspring. The decreased rate over time for probands had not been originally hypothesized and the result might be spurious. However, one might

speculate that the decreasing endorsement for A1 in AUD probands might reflect the combination of higher levels of maturity between the early 30s and mid-40s along with decreasing pressures with age of raising young children and potentially diminished worrying about seeking success in one's vocation (Conger et al., 2000; Crnic and Low, 2002; Wrzus et al., 2013). Similarly, while another change was not hypothesized and any conclusions should be drawn with caution, the only criterion for which the change over time was significant for offspring but not probands was an increase in the rate of endorsement of giving up important activities due to alcohol (D6). This result in the younger generation might reflect the mirror image of some of the same changes over time noted in probands where the lower level of maturity and higher levels of impulsivity in the 20s contributed to the younger participants being more likely to take time to drink rather than attend to other activities.

The current analyses focused on DSM-IV criteria, but the results might be relevant to DSM-IIIR as well. As to DSM-5, ten of the 11 diagnostic criteria are the same across the three systems, and the only change in criteria occurred when DSM-5 deleted legal problems (item A3 in DSM-IV) and added a new criterion involving craving (Hasin et al., 2013). Although in prior Item Response Theory (IRT) analyses legal problems and craving were both found to add relatively little information to the latent concept of the DSM diagnosis or to not fit into a continuum with the other criteria (e.g., Hasin et al., 2013; Saha et al., 2006), those were largely based on cross-sectional analyses and it is not clear whether the results of the current analyses would be similar if data on craving had been available, Another difference between the three DSM approaches to an AUD diagnosis is that DSM-5 required endorsement of at least 2 criteria for a diagnosis while DSM-IIIR and DSM-IV abuse required only a single item. In light of this difference, it is noteworthy that the re-analyses of the data from Tables 2 and 3 after limiting the sample to subjects who endorsed at least two criteria did not produce major changes in the current results. However, direct testing of the applicability of our findings to other diagnostic systems will be important.

These analyses reported information from two generations in the SDPS. Data from both proband and offspring samples supported Hypothesis 1 and both subgroups demonstrated increases over time in the proportions endorsing criterion D5, spending a great deal of time involved with alcohol. However, although some findings in probands were similar (although not significant) in offspring, patterns for other criteria followed a different course regarding significant changes in the two generations. Such differences across older and younger individuals with persistent AUDs are not surprising in light of prior studies that documented differences in the typical ages of onset of some alcohol problems over time (e.g., Jellinek, 1952; Schuckit et al., 1995).

In summary, the current analyses support two major conclusions. First, the salience of many DSM AUD criterion items among individuals with persistent AUDs changed significantly with age in both SDPS generations. This finding occurred despite the use of the same interview instrument and the same principal investigators who prospectively evaluated the same individuals in both generations at all relevant follow-ups. These consistencies are important because differences in each of these items can affect the pattern of diagnostic item performance (Buu et al.,2012; Lane et al., 2016; Saha et al., 2006, 2020; Vize and Lane, 2021). The second overarching conclusion is the relative paucity of data on the question

of whether the psychopathological process involved in AUDs manifests in different ways across development in the same individuals with persistent AUDs, a question that requires more study. In the current analyses both generations demonstrated decreases in endorsement of tolerance and an increasing prevalence of experiencing a great deal of time to obtain, use or recover from the effects of alcohol. There was more modest consistency across generations for endorsement of the use of alcohol in hazardous situations, but additional studies are needed to evaluate whether the specific items that change with age during persistent AUDs might differ in different populations.

The relatively unique nature of the data presented here regarding changes in endorsement of specific DSM AUD items across multiple evaluations of individuals with persistent AUDs contributes to the need to emphasize some important caveats. First, the data regarding the offspring across two timepoints are especially tentative because of their relatively short follow up. Second, it is important to remember that two different groups of subjects provided the data for the changes in endorsements for the ages 21-to-27 and 31-to- 43-year-old samples. Third, the samples for both AUD probands and offspring are somewhat small. Fourth, the current population is almost exclusively European American and relatively well-educated and, thus, the generalizability to other ethnic and education groups is not clear. Similarly, our requirement that an AUD had to be present at multiple time points excluded subjects with less persistent AUDs as well as those with no alcohol diagnoses and it is possible that the current results do not represent a more general pattern of AUD item endorsement over time (Berkson, 1946). Fifth, The SDPS selected male but not female probands, and no data are available on females in their fourth and fifth decades. Also in light of the variability in the course of AUDs over time (Goncalvez et al., 2017; Jacob et al., 2009; Schuckit et al., 2016; Sloan et al., 2011), as clinical researchers and clinicians we believe that there are assets for understanding the picture of both recent histories and vulnerabilities toward future alcohol problems from focusing on a five year course of alcohol problems rather than limiting our analyses to the prior 12 months as might be considered as a current condition. It is possible that a different pattern of results might have been seen with a 12-month window of alcohol problems. Next, the data collection and subsequent analyses did not include the item of craving and, thus, the applicability of the current data to DSM-5 is not clear. Finally, the data relate only to alcohol and additional studies are needed to determine the age-related patterns of changes in endorsement that are likely to be seen in individuals with other substance use disorders.

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Table 1

Current Demography, lifetime Alcohol, Drug Related, and Personality Variables For Probands and Offspring at the Time of Their First AUD Interview

Variables Probands and Offspring	Probands % (n) or Mean (SD) N = 106	Offspring % (n) or Mean (SD) N = 68
Demography		
Male %	100 (106)	70.6 (48)
Age at First AUD Interview	31.5 (4.75)	20.8 (3.17)
European-American %	98.1 (104)	88.2 (60)
Married %	48.1 (51)	8.2 (6)
Education (years)	16.8 (2.19)	12.7 (1.45)
Have a Parent with AUD %	68.9 (73)	39.7 (27)
Prior 5-Year Alcohol		
Alcohol Dependence %	62.3 (66)	55.5 (38)
Maximum Drinks/Occasion	14.2 (5.85)	14.6 (4.82)
Number DSM-IV Criteria Endorsed	3.7 (1.99)	3.3 (1.84)
Prior 5-Year Drugs		
Smoking %	16.0 (17)	7.4 (5)
Use Cannabis %	81.1 (86)	83.8 (57)
Use Drugs Other than Cannabis %	63.2 (67)	51.5 (35)
Cannabis SUD %	20.8 (22)	39.7 (27)
SUD Other than Cannabis %	23.6 (25)	17.6 (12)
Personality Measures		
Karolinska Impulsivity	20.9 (2.72)	22.6 (3.58)
Zuckerman Sensation Seeking	22.3 (5.16)	21.4 (6.38)

AUD = Alcohol Use Disorder; SD = Standard Deviation; SUD = Substance Use Disorder

DSM-IV = Fourth Diagnostic and Statistical Manual of American Psychiatric Association

Table 2

Rates of Endorsements of the 11 DSM-IV Criteria Items over 12 Years in 106 Probands with Alcohol Use Disorders in the San Diego Prospective Study

DSM IV items	Time 1 % (n) Age 31.5 (4.75)	Time 2 % (n) Age 38.0 (5.49)	Time 3 % (n) Age 43.2 (5.64)	Statistics Overall	Time 1 vs. 2	Time 1 vs. 3	Time 2 vs. 3
Dependence							
1: Tolerance	63.2 (67)	16.0 (17)	17.9 (19)	70.71[c]	−7.43[c]	−7.13[c]	0.30
2: Withdrawal	14.2 (15)	3.8 (4)	5.7 (6)	9.36[b]	−2.87[a]	−2.35	0.52
3: Drink Higher Amounts or Longer	63.2 (67)	77.4 (82)	68.9 (73)	6.33[a]	2.50[a]	1.00	−1.50
4: Desire/Unable Decrease or Control	35.8 (38)	28.3 (30)	33.0 (35)	2.33	na	na	na
5: Much Time to Get/Use/ Recover	13.2 (14)	17.9 (19)	29.2 (31)	11.45[b]	0.97	3.29[b]	2.32
6: Give Up Activities Due To Alcohol	10.4 (11)	19.8 (21)	14.2 (15)	4.22	na	na	na
7: Use Despite Physical/ Psychological Problems	15.1 (16)	11.3 (12)	16.0 (17)	1.40	na	na	na
Abuse							
1: Failure to Fulfill Obligations	52.8 (56)	23.6 (25)	24.5 (26)	28.65[c]	−4.71[c]	−4.55[c]	0.15
2: Use in Hazardous Situations	77.4 (82)	60.4 (64)	47.2 (50)	25.73[c]	−2.85[a]	−5.06[c]	−2.21
3: Recurrent Legal Problems	11.3 (12)	5.7 (6)	5.7 (6)	4.24	na	na	na
4: Use Despite Social/ Interpersonal Problems Average Endorsement Across Criteria	12.3 (13) 33.5	24.5 (26) 26.2	42.5 (45) 27.7	33.06[c]	2.32	5.69[c]	3.73[c]

[*] For pairwise comparison, reporting Standardized Test Statistic Using Related-Samples Cochran's Q Test

a: $p < .05$

b: $p < .01$

c: $p < .001$ [NOTE: within each item run, significance values adjusted by Bonferroni corrections]

DSM-IV= Fourth Diagnostic and Statistical Manual of the American Psychiatric Association; na = not applicable, since no overall (all 3 time points) significance

Table 3

Rates of Endorsements of the 11 DSM-IV Criteria Items over 6 Years in 68 Offspring with Alcohol Use Disorders in the San Diego Prospective Study

DSM IV items	Time 1 %(n) Age 20.8 (3.17)	Time 2 % (n) Age 27.0 (3.95)	Time 1 vs. 2
Dependence			
1: Tolerance	54.4 (37)	41.2 (28)	−2.46
2: Withdrawal	2.9 (2)	5.9 (4)	2.00
3: Drink Higher Amounts or Longer	64.7 (44)	73.5 (50)	1.50
4: Desire/Unable Decrease or Control	19.1 (13)	29.4 (20)	2.53
5: Much Time to Get/Use/Recover	41.2 (28)	76.5 (52)	18.00[c]
6: Give Up Activities Due To Alcohol	16.2 (11)	30.9 (21)	4.17[a]
7: Use Despite Physical/Psychological Problems	8.8 (6)	16.2 (11)	1.67
Abuse			
1: Failure to Fulfill Obligations	45.6 (31)	48.5 (33)	0.12
2: Use in Hazardous Situations	45.6 (31)	36.8 (25)	−1.50
3: Recurrent Legal Problems	5.9 (4)	2.9 (2)	−0.67
4: Use Despite Social/Interpersonal Problems Average Endorsement Across Criteria	23.5 (16) 29.8	35.3 (24) 36.1	2.67

[*] For pairwise comparison, reporting Standardized Test Statistic Using Related Samples Cochran's Q Test

a: $p < .05$

b: $p < .01$

c: $p < .001$

DSM-IV= Fourth Diagnostic and Statistical Manual of the American Psychiatric Association