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Turning Points in the Lives of Youth of with/without ADHD: Are They Linked to Changes in Substance Use?

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Abstract

Objective—This study examines the behavior beliefs, social supports, and turning points in individuals with/without Attention-Deficit/Hyperactivity Disorder (ADHD) related to their substance use/abuse (SU/A) decisions.

Method—The coded interviews from sixty participants with/without ADHD were compared for their SU/A decisions and precipitants to these decisions among abstainers, persisters, and desisters.

Results—ADHD subjects reported fewer social advantages to avoid SU/A than non-ADHD subjects. Desisters and persisters reported more social advantages of using drugs than abstainers. Persisters reported both more negative and positive psychological/physiological effects of SU/A. ADHD subjects reported fewer positive role models in their lives. Non-ADHD patients reported more positive turning points than ADHD subjects, regardless of SU/A status.

Conclusions—ADHD individuals face challenges in making healthy decisions about SU/A due to lack of positive role models. Reinforcing accurate behavioral beliefs may be important to change behaviors in individuals with SU/A or to prevent SU/A initiation in ADHD individuals.

Keywords

Attention-Deficit/Hyperactivity Disorder; Substance Use; Turning Points; Decision-making; Stages of Change; Theory of Reasoned Action; Unified Theory of Behavior; Self-efficacy; Mixed Methods

Substance use/abuse (SU/A) among youth poses major public health risks world-wide. US data from 2012–2014 indicate that one-fourth of youth aged 12–17 tried illicit drugs and 58% of young adults used illicit drugs by age 25 (National Institute on Drug Abuse, 2015). Youth with ADHD are at even greater risk for SU/A compared with healthy controls (Lee, Humphreys, Flory, Liu, & Glass, 2011), with risk factor studies now spanning decades (Biederman et al., 2006; Biederman et al., 1997; Molina et al., 2007; Molina & Pelham, 2014). Although ADHD may pose risks for SU/A due to its characteristic inattention and impulsivity, children with ADHD also have a host of additional risk factors for SU/A. These include impaired social function, parental drug/alcohol use, possible biologic factors (i.e.; genes, central nervous system dysfunction), and environmental/contextual variables (i.e.; unstable residence, drug use in peers), all of which may interact to increase SU/A susceptibility in youth with ADHD (Molina & Pelham, 2014).

Despite progress in knowledge of specific risk factors linked to SU/A in youth with and without ADHD, little research has examined whether or how these risk factors predict individuals' decisions to abstain, initiate, persist, or desist from SU/A (Hser, Longshore, & Anglin, 2007). This is a surprising omission given 40 years of basic science research on (a) how and why individuals decide to perform new behaviors and (b) which specific “ingredients of change” must be present before individuals are willing to abandon one behavior and adopt a new one (Bandura, 1977; Fishbein, 2008; Prochaska & DiClemente, 1992). This research has been informed by self-efficacy theory as well as the theories of *reasoned action* and *planned behavior* (TRA, TPB). Three well-established predictors (and

necessary ingredients) of behavior change (*behavioral beliefs, normative beliefs, self-efficacy beliefs, and actual behavioral intentions*) have been circumscribed within the *unified theory of behavior* (UTB), an overarching model that emerged out of an NIMH consensus workshop (Jaccard, 2012; Jaccard, Dodge, & Dittus, 2002; Jaccard & Turrisi, 1999).

Despite the sound empirical and theoretical underpinnings of UTB, these basic science predictors of behavioral change have not been applied to studying behavior change and decision-making in individuals who abstain, start, stop, or persist in SU/A, especially in terms of a developmental life course perspective (Teruya & Hser, 2010). This gap in understanding partly relates to the assessment methods from previous studies, including checklists or tightly structured variables, developed by researchers and elicited from research subjects. These pre-cast variables may not capture subjects' personal explanatory (e.g., UTB) models of how and why they decide to perform new behaviors or abandon previous ones over their life course. Nor do such measurement methods fully assess the effects of youths' perceived environments and contexts that may be precipitants for decision-making and long-term behavior change.

A complementary line of research has focused on what has been called the trans-theoretical model, also known as the stages of change model (Prochaska & DiClemente, 1983, 1992). This line of research on decision-making and behavior change has shown that prior to changing a behavior, individuals must first begin to contemplate the pros and cons of a new behavior, often set in motion by various life circumstances. The trans-theoretical model is less than a theory per se but can be useful to interventionists to understand the characteristics, attitudes and cognitions of individuals as they move through the process of behavior change: from pre-contemplation, active contemplation, preparation for change, behavior change, and maintenance of ongoing behavior change. During pre-contemplation, individuals may not have the slightest interest or thoughts about changing from one behavior to another. During the contemplation stage, they may begin to see the advantages and disadvantages of their current behavior more clearly and to consider the possible greater advantages of a new behavior. Commonly, these new cognitions are set in motion by an event or events of some importance in the individual's life. Multiple events may in fact eventually strengthen the individual's determination to make a behavior change. For our purposes, we call these events and their related cognitions "turning points", events that the individual retrospectively identifies as an important circumstance that they believe led them to begin to change or to consider change (Hser et al., 2007; Teruya & Hser, 2010).

These two approaches (UTB, stages of change) to understanding change have rarely been applied to understand individuals' SU/A-related decision-making or the contextual variables that may precede youths' SU/A behavior patterns of initiating, resuming, and/or stopping drug use. A focused examination of the cognitive and emotional processes preceding change, as well as environmental and contextual factors to which individuals attribute to their later behaviors ("turning points") may shed new light on individuals' SU/A – related decision-making, and possibly also lead to new SU/A prevention or intervention efforts, both with individuals with and without ADHD (Teruya & Hser, 2010).

To address the gap in understanding decision-making around SU/A in individuals with ADHD, this paper presents data from intensive interviews of 60 of 183 youth drawn from the MTA sample. While in their early 20s, they completed semi-structured interviews designed to elicit their reports of turning points in their decisions related to SU/A, education, vocation, marriage, personal relationships, mental health treatment, help-seeking, and overall life functioning. We decided to examine the predictors of behavior change among these youth by first identifying 3 different groups that should maximally differ, in terms of their life decisions to abstain, continue or desist from SU/A (abstainers, persisters, and desisters), and then to compare and contrast the groups by examining and counting their self-descriptions of turning points (and associated behavioral beliefs, self-efficacy beliefs, and norms related to substance use) on their SU-related decisions. In addition, we sought to determine whether the key predictors of behavior change would differ among the three as a function of whether they have histories of ADHD or not. Our hypotheses are as follows:

1. Persisters will express a greater number of positive behavioral beliefs (i.e., positive comments about drug use effects) than desisters and abstainers.
2. Abstainers will express a greater number of negative behavioral beliefs (i.e., negative comments about drug use effects) than persisters, with desisters in between.
3. Desisters will identify more social supports (positive normative influences) than persisters.
4. ADHD persisters will express a greater number of negative behavioral beliefs (negative comments about substance use effects) than persisters without ADHD, possibly because users with ADHD are more likely to persist despite ill effects.
5. Desisters will have more positive turning points than persisters.
6. Individuals without ADHD will have more positive turning points than individuals with ADHD.

The Multimodal Treatment Study of ADHD (MTA) sample is ideal for testing these hypotheses, as it has prospectively collected longitudinal data about many aspects of functioning as well as history of substance use from childhood through early adulthood, with intensive follow-up interviews during early adulthood.

Method

Subjects were drawn from the longitudinal follow-up of the MTA. In the original study, 579 children with ADHD age 7–9.9 years were randomly assigned to one of four treatment groups: Medication Only (MedMgt), Behavioral Treatment Only (Beh), Combined Treatment (Comb), or Community-treated Comparison (CC); study treatments are detailed elsewhere (MTA Cooperative Group, 1999; Greenhill et al., 1996; Wells et al., 2000). Follow up assessments were conducted at completion of the 14-month treatment phase, at 24 and 36 months following randomization and again at 6, 8, 10, 12, 14, and 16 years after randomization. A Local Normative Comparison Group (LNCG) of children ($N = 289$) was recruited at the 24-month point from the same schools attended by the children with ADHD

and followed alongside the ADHD group. Adult retention at the 16-year follow-up was 72% for ADHD group and 84 % for LNCG. Turning points interviews were done when youths were between approximately 22 – 25 years old. To avoid subject burden and minimize any possible contamination, qualitative interviews were conducted either 1) more than two months before the most recent assessment, or 2) more than two weeks after that assessment.

Turning Points Study Recruitment

From the original MTA sample, 183 youth were recruited across 4 of the 6 sites to participate in the “Turning Points” interview study. Recruitment aimed to fill four cells in a 2 (ADHD versus LNCG) $\times$ 2 (persistent substance user versus abstainer/experimenter) unbalanced design with the intention of oversampling participants with an ADHD history and participants with persistent SU/A through adolescence into early adulthood. Participants were from four of the original seven MTA sites: University of California, Irvine ($n = 53$), Duke Medical Center ($n = 52$), University of California, Berkeley ($n = 52$), and Montreal Children’s Hospital ($n = 26$). The Montreal site recruited fewer participants to reflect their original pool that was half the size of most MTA sites. A total of 60 persistent substance users were initially desired; 58 participated. The Substance Use Questionnaire (SUQ) (Molina & Pelham, 2003), adapted for the MTA, includes questions about alcohol, tobacco, marijuana, other illicit drugs (e.g., cocaine), and misuse of prescription drugs (Molina et al., 2007; Molina et al., 2013). Positive substance use reports on the SUQ were based on developmentally specific thresholds selected for each type of substance and developmental period. These thresholds were chosen to reflect the well-established prognostic importance of early onset of substance use and the well-established escalation of substance use that occurs between childhood and adulthood in vulnerable youth (Chassin, Colder, Hussong, & Sher, 2016; Windle et al., 2008). The remaining ADHD participants were recruited using random selection to obtain balanced representation across the four original treatment group assignments within each site; the remaining LNCG participants were randomly selected from the available pool of LNCG participants in the larger study. Only five potential qualitative interview study participants declined participation (see Weisner et al., in review, for more details).

Identifying Substance Use Trajectory Groups: Persisters, Abstainers, and Desisters

Subsequent review and coding of all subjects’ narrative interviews indicated that a subset of subjects admitted to more substantial and continuing SU/A during the Turning Points interviews than they had originally indicated on their Substance Use Questionnaire reports. Thus, an additional 10 subjects were classified as *persisters* (*users since early to mid-adolescence up to the time of the interviews*) users, making a total of 67 persisters (50 ADHD, 17 LNCG).

In addition to the persisters, other trajectories and patterns of SU/A were identified. Thus, based on their SUQ data and subsequent young adult interviews 32 subjects could be classified as lifetime *abstainers* (18 ADHD, 14 LNCG), and another 58 as *desisters* -- individuals with earlier periods of light/experimental use to heavy, substantial SU/A, eventually culminating in desistance during young adulthood by the time of the interviews (39 ADHD, 19 LNCG). Given the heterogeneity among the desisters in terms of the severity

and duration of their previous substance use histories, we further defined a more homogeneous subgroup of desisters, based on the more stringent requirement that they had to have at least 2 previous assessments documenting ongoing SU/A, and after that, at least 4 years of ongoing abstinence, including the point of the qualitative interviews (18 ADHD, 15 LNCG).

Please also note, given the ubiquity of SU/A experimentation among teens, “abstainers” included both youth who reported never using illicit drugs or heavy use of alcohol, and youth who admitted to a single brief period of “experimentation”, followed by no subsequent periods of heavy use (see Weisner et al., in review, for further description of how “abstainers” were defined).

Two other SU/A trajectory groups were also identified, but these were not included in our analyses for two reasons: 1) numbers were insufficient for group comparisons across ADHD and LNCG subjects, and 2) tests of behavior change theory are difficult under circumstances where there is no single, crystallized, and clear decision (to abstain, to desist, or to persist) concerning SU/A. Thus, 16 subjects showed a pattern characterized as “*late starters*,” with no significant early SU/A, beginning significant SU only in young adulthood, at age 18 or greater (9 ADHD, 7 LNCG). A final 10 subjects fit a pattern of “*resumers*” – multiple periods of starting, stopping, and resuming SU/A (9 ADHD, 1 LNCG).

To create gender-matched ADHD and LNCG groups from the 3 trajectories, 10 ADHD subjects and 10 LNCG subjects were randomly selected from each SU/A group with a male/female ratio of 4/1, yielding a total of 60 subjects balanced across ADHD/LNCG status and SU trajectory status.

Coding and Reliability

As noted in Weisner et al., in review, all interviews were digitally recorded, transcribed, and entered into a web-based research and analysis database system, Dedoose, after which they were coded using raters trained to reliability to identify themes and topics. The interviews were coded in terms of overall life perspectives and SU-related perspectives. The overall life perspectives included current work and schooling conditions, self-knowledge, personal goals, family/friends relationships, daily activities, and turning points in life. The SU-related perspectives included reasons for abstaining from SU, initiating and persisting SU, active attempts to desist from SU, relationship between emotional functioning and SU, impacts of others’ SU experiences and family members’ roles in individuals’ SU decision-making, and relationship between ADHD symptoms and SU. For the overall study, Kappa and percent agreements averaged .80 across all the topics. All the individual topics have Kappa reliabilities above .70. For this report and in order to understand youths’ “decisions” related to SU, we focus on turning points as a triggering event to lead the youths to an action stage of behavior change, noted in the stages of change model, and three areas related to behavior change (behavioral beliefs, normative beliefs/social forces, and self-efficacy beliefs), described in the UTB model.

Turning Points

The first theme concerns “turning points” -- events/life experiences identified by youth as linked in their minds to important, subsequent life decisions, including abstaining from, starting, persisting in, or desisting from SU/A. Turning points were categorized as negative or positive, depending on the outcomes of the turning points: negative turning points were identified as events that adversely influenced the subjects’ emotions, thoughts or behaviors, inclining them to SU/A; positive turning points were defined as life events that the subjects felt benefited them, inclining them to continued abstinence or desistence. Total numbers of the turning points, either positive or negative, were counted for each subject.

Basic theory-guided predictors of behavior change—1) *behavioral beliefs*, 2) *normative beliefs*, and 3) *self-efficacy beliefs*. Each of these theory-guided predictors of change is described in detail below.

1) “Behavioral beliefs” are an individual’s specifically held beliefs about the perceived positive or negative consequences of one’s own behaviors, including one’s decisions about abstaining, initiating, desisting, or persisting in SU/A. Such beliefs about the consequences of one’s SU/A-related decisions might be either positive (e.g., this behavior helps me) or negative (this behavior hurts me). Both positive and negative expected values are tallied separately. Thus, for each subject we first simply tallied the total number of expressed/perceived negative beliefs about adverse psychological, emotional, or behavioral consequences associated with their SU/A (e.g., anxiety, depression, or aggression, isolation from others, job loss, or legal consequences, etc.), and likewise tallied the number of beliefs about any anticipated positive psychological, emotional, and behavioral effects of their SU/A decisions. Please note, the terms “positive” and “negative” are from the perspective of the individual. A given individual may harbor positive beliefs about using/continuing SU/A, while also having concerns about negative consequences as well. Another individual may only harbor mainly only negative beliefs about SU/A. The relative balance of positive vs. negative beliefs about a given behavior within any individual is a key determinant as to whether they will perform that behavior, including abstaining, initiating, desisting or persisting in SU/A behaviors. For purposes of better understanding youths’ SU/A decisions, behavioral beliefs were sorted by 2 different domains: social/societal consequences that might incline one to either SU/A use or avoidance) (e.g, to become more popular vs. to avoid the possibility of job loss); and psychological/physiological consequences, also inclining an individual to use vs. avoidance (e.g., drugs relax me vs. drugs make me irritable/aggressive). Instances or interview “mentions” of these 4 different types of beliefs were tallied separately for each individual, and then an overall difference score was computed, subtracting the numbers of total beliefs leading to abstinence or desistence from the number of beliefs leading to use/abuse.

2) Normative beliefs were measured by adding the numbers of spontaneously identified supportive peers who helped them attempt or achieve abstinence, the overall numbers of supportive people in life mentioned during their interviews, and “role models” that influenced their SU/A-related decisions. Three types of role models were identified through the interview codes: 1) Positive role models whose positive behaviors positively influenced

the subjects' SU/A behaviors or decisions in a positive manner (i.e., towards abstinence or desistence); 2) Negative role models whose negative SU/A behaviors negatively influenced the subjects' behaviors or decisions in a negative manner (i.e., towards SU/A); and 3). Negative role models whose negative behaviors *positively* influenced the subjects' behaviors and SU/A decisions towards abstinence or desistence (e.g., "I don't want to go down the same bad path as my father"). The impacts of these role models on SU decisions either for abstaining, desisting, or continuing SU/A were compared across SU/A groups and as a function of their ADHD/LNCG status.

3) Self-efficacy beliefs were measured by counting the numbers of reported subjects' beliefs in their own self-control and confidence, and statements indicating that they can and must succeed in life. In desistence or abstinence from SU, for example, a comment such as "I can take control over myself if I don't use drugs" or "I have strong self-control so I don't give in to drugs" was counted as a self-efficacy belief. In continuation of SU, for example, a comment like "I am mentally too weak to stop using drugs" was counted as a negative self-efficacy belief, related to a youth's persistence in using drugs.

Analyses

For purposes of examining youths' decision-making vis-à-vis decisions to initiate, desist, or persist in SU/A, we examined and compared the predictors of behavior (and behavior change) in the 3 largest of the 5 trajectory groups: *abstainers*, *desisters*, and *persisters*; 20 from each trajectory group, balanced across ADHD and LNCG subjects, total $n = 60$.

From youths' narrative interviews, each instance of the presence of each of the three predictors of behavior change (behavioral beliefs, norms, and self-efficacy beliefs) were coded (code = 1) and then tallied within individuals, comparing subjects by trajectory group and ADHD/LNCG status (essentially a 3×2 comparison design). Because the excerpts could indicate the presence of multiple instances of specific predictors of change (e.g., multiple examples of positive behavioral beliefs), the total numbers of predictors of behavior change within individuals were tabulated, comparing totals and averages across the 3×2 groups.

Results

Mean ages of abstainers, desisters, and persisters in ADHD subjects were 24.0 years, 25.5 years, and 25.2 years (SD 1.2, 0.5, and 0.8). Also, mean ages of abstainers, desisters, and persisters in LNCG subjects were 24.0 years, 23.8 years, and 23.8 years (SD 0.7, 1.3, and 0.8). Unexpectedly, ADHD subjects were 1.7–1.8 years older than LNCG subjects, particularly among desisters and persisters ($p < .0001$). In addition, as expected, the 3 SU/A groups differed in the average number of substances they had either briefly experimented with (e.g., abstainers [ADHD 1.3, LNCG 1.4]) or used (desisters [ADHD 3.6, LNCG 3.7] and persisters [ADHD 4.2, LNCG 3.7]). ADHD and LNCG subjects experimented or used similar numbers of substances.

Table 1 presents the first of the key predictors of behavior change decisions: subject's positive and negative behavioral beliefs about initiating, desisting, or persisting in SU/A, and

perceived positive and negative effects of drugs on themselves. Across all SU/A groups, individuals with ADHD showed fewer social or societal reasons why they should stop or not ever start SU/A compared to LNCG subjects, although this tendency was not significant in pairwise contrasts differences between any of the groups.

In contrast, Table 1 indicates that the three SU/A groups differed in the perceived numbers of social/societal reasons in favor of SU/A, as well as the perceived negative physiologic or psychological consequences of SU/A on themselves, with the highest number of reasons reported by persisters, and desisters, both differing significantly from abstainers in pairwise contrasts. This Table also indicates that subjects differed in terms of the perceived negative physiologic/behavior effects on themselves of SU/A, with significant differences in pairwise contrast between the abstainers and persisters. Despite greater numbers of negative effects in persisters and desisters, these two groups also tended to perceive greater physiologic/psychological benefits of SU/A for themselves (e.g., increased concentration, improved creativity, decreased anxiety), though not as a function of ADHD vs. LNCG status.

The final analysis in Table 1 examines the difference scores of the numbers of total beliefs leading to abstinence or desistence minus the number of beliefs leading to use/abuse. This analysis indicates substantial differences in the belief structures of the 3 SU/A groups, and a trend towards difference between ADHD and LNCG subjects.

Table 2 presents the impact of norms and social factors on subjects as a function of their SU/A group and ADHD vs. LNCG status. Of these 5 variables, four showed significant overall effects in the analytic models: as can be seen here, ADHD subjects had overall fewer positive role models than LNCG subjects, fewer persons that had tried to help them quit (particularly among persisters), more peers who influenced them negatively vis-à-vis their SU/A decisions, and fewer numbers of supportive people in their lives. For this last variable, the SU/A groups also differed significantly, with abstainers showing generally the greatest number of supportive persons and persisters the fewest, consistent with our initial hypotheses.

Table 3 reveals differences between the SU/A groups in self-efficacy, though not as a function of ADHD vs. LNCG status. Consistent with our initial hypotheses about the importance of spontaneously discussed beliefs in one's own self-control, abstainers showed the highest overall levels followed by desisters and persisters.

Finally, comparisons of the number of positive and negative turning points reported by the LNCG vs. ADHD subjects (Table 4) generally showed more negative turning points as a function of SU/A group, particularly among ADHD persisters, and fewer positive turning points among ADHD subjects than LNCG subjects.

Discussion

This study used intensive qualitative interviews of 60 youth from the MTA sample to examine the interaction of childhood ADHD with predictors of behavior decisions to abstain, initiate, desist or persist in SU/A and numbers of positive and negative turning points that may have led the youth to subsequent life decisions pertaining to SU/A. It has

been well established by numerous other studies that youth with ADHD are more vulnerable to substance-use disorders, probably as a result of impulsivity, less forethought, social dysfunction, and difficulties with life challenges (Molina & Pelham, 2014). However, little has been done to examine possible predictors of their SU/A decisions, and how such determinants may differ from those of youth without ADHD.

Overall, we found that basic science models of behavior change (UTB and stages of change [turning points]) may provide explanatory power to youths' decisions to abstain, initiate, stop, and persist in SU/A, both among youth with and without ADHD. Although ADHD youth tend to express fewer reasons to not use substances than youth without ADHD, other behavioral beliefs did not differ among groups as a function of ADHD/LNCG status. In contrast, both positive and negative behavioral beliefs about SU/A did distinguish abstainers from persisters and desisters. Moreover, beliefs in the psychological/physiological benefits of SU/A distinguished between desisters and persisters, with persisters attributing greater benefits to SU/A than desisters, despite more comments about negative SU/A effects on themselves. One might speculate that SU/A persisters, particularly among those with ADHD, perceive some negative aspects of their own personal functioning that they are attempting to "self-medicate," analogous to youths' actual statements cannabis is "therapeutic" for ADHD (Mitchell et al., in review), despite evidence that cannabis use has more short-term and long-term negative effects on ADHD youths' neurocognitive and motor functions (short-term memory, motor coordination, and judgment) than among non-ADHD youth (Mitchell et al., in review). Since at least a subset of youths' attributions (persisters) about the effect of SU/A (particularly marijuana) on their functioning differs from other studies, additional research may be needed to address whether such perceptions are simply biased retrospective reports in their personal explanations of why they persist, or whether in fact, there are indeed benefits for some youth in functioning (e.g., reduced anxiety, etc.).

Norms and social forces are another key predictor of behavior change. We found that youth with ADHD had fewer positive role models and supportive persons in their lives and reported more negative role models in their SU/A-related decisions. Because ADHD youth tend to have greater difficulties in their social and interpersonal skills, such problems may in turn lead to fewer long-term positive peer relationships and supportive family environments (Molina & Pelham, 2014), which then further contribute to risks for early initiation and persistence in SU/A (Hser et al., 2007). Such findings suggest the need for and possible benefits from environmental interventions that enhance the positive social networks to which youth with ADHD are exposed, in order to increase the likelihood of ongoing avoidance of SU/A, or to encourage desistance before longer-term SU/A patterns are set and any positive social networks are disrupted.

Our examination of the third key predictor of behavior change within the UTB model, self-efficacy, failed to reveal any differences between ADHD and LNCG subjects, but did demonstrate differences among the 3 SU/A groups, with the lowest overall levels found among persisters. Self-efficacy, particularly important in achieving one's goals, is mainly formed by ongoing self-evaluation of one's performance through direct and indirect experience in his/her past (Cervone & Pervin, 2013). According to previous studies, individuals with high self-efficacy make more efforts and achieve better outcomes, showing

less anxiety and higher coping skills in challenging situations (Cervone & Pervin, 2013). Considering necessary steps to achieve abstinence in SU/A, youth have to decide to not initiate or desist from SU/A, as well as continue to abstain from SU/A, all of which require high coping and cognitive skills to maintain psychological and social wellness across varied life events. Yet our study found no differences in self-efficacy statements levels by ADHD/LNCG status, perhaps surprising considering the previous reports of lower self-efficacy in individuals with vs. without ADHD (Newark, Elsässer, & Stieglitz, 2016), especially since youth with ADHD often experience academic and social difficulties with a sense of lack of control over events, affecting their performance and self-efficacy (Frame, Kelly, & Bayley, 2003). In contrast, we did find difference in self-efficacy as a function of SU/A group status, with the lowest levels among persisters. In this study it is not possible to determine if this finding is a cause, an effect, or merely an association with individuals' SU/A decisions. However, because high self-efficacy is associated with behavior change, these findings suggest that future research should examine self-efficacy among persistent substance users, and test strategies to increase self-efficacy to determine if such approaches increase their actual substance use desistence.

Lastly, our examination of turning points revealed several important differences. More negative turning points were found as a function of SU/A status, especially among ADHD persisters, and fewer positive turning points were found for ADHD vs. LNCG subjects. Because turning points are often related to social networks and forces, the fewer available positive social supports (Table 2) in the lives of individuals with ADHD may in turn lead to fewer positive turning points. This possibility will need to be further examined in future prospective studies.

Although our study poses strengths, particularly using prospective longitudinal data from the MTA study, there are some limitations. Our sample size is relatively small due to intensive interview and analysis process of the qualitative study, which could affect the results. Furthermore, the data were collected through extensive interviews of life events and SU/A related decisions, which could be biased due to individuals' inaccurate recalls and retrospective interpretations of their decisions and the presumed meaning of life events.

Clinical Implications: Overall results suggest that young adults with ADHD may be more prone to SU/A over their life course due to fewer beliefs in the benefits of abstinence or moderation, a relative mix of multiple beliefs that favor use over non-use, lack of positive role models and supportive people, and lower self-efficacy. For both youth with and without ADHD, our findings suggest the following possible clinical strategies: 1) Reinforce positive/accurate behavioral beliefs. This strategy may be especially important to prevent SU initiation. 2) Expose users to data about negative effects; helping them work through their beliefs and the pros and cons of SU/A (e.g., via motivational interviewing); 3) Promote the establishment of relational ties to individuals and organizations with strong positive values/self-efficacy beliefs; and 4) Examine the benefits of direct interventions focusing on increasing individuals' self-efficacy (e.g., "I can quit" or "I can limit my use").

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Table 1

Behavioral Beliefs, Stratified By ADHD/LNCG Status and SU/A Group

	Behavioral Beliefs			Overall Model	ADHD vs. LNCG		SU/A Group
	Abstainers	Desisters	Persisters		F (p)	F (p)	
	Mean (SD)	Mean (SD)	Mean (SD)	df	F (p)	F (p)	F (p)
<u># of societal reasons to not do SU/A</u>							
ADHD	8.5 (3.0)	8.3 (2.7)	7.7 (2.2)	3, 56	3.3 (0.028)	6.2 (0.016)	1.8 (0.17)
LNCG	10.2 (2.6)	8.3 (2.7)	8.9 (3.0)				
<u># of societal reasons to do SU/A</u>							
ADHD	0.9 (1.3) ^a	4.4 (2.3) ^b	7.2 (3.5) ^b	3, 56	24.3 (<.0001)	1.3 (0.25)	35.8 (<.0001)
LNCG	0.1 (0.3) ^a	5.2 (2.6) ^b	6.0 (1.8) ^b				
<u>Negative Psychol/Phys Effects</u>							
ADHD	0.9 (0.7) ^a	0.9 (1.0) ^{ab}	1.5 (0.5) ^b	3, 56	3.0 (0.040)	2.1 (0.15)	3.4 (0.041)
LNCG	1.0 (0.7) ^a	1.5 (0.9) ^{ab}	1.7 (1.0) ^b				
<u>Positive Psychol/Phys Effects</u>							
ADHD	0.2 (0.4) ^a	1.0 (0.9) ^b	2.5 (1.7) ^c	3, 56	33.3 (<.0001)	0.0 (1.0)	50.0 (<.0001)
LNCG	0.0 (0.0) ^a	1.1 (1.2) ^b	1.8 (0.8) ^c				
<u>Overall Sum of +/- Effects on SU/A</u>							
ADHD	8.1 (0.4) ^a	3.4(0.9) ^{bc}	-0.5(1.7) ^{bd}	3, 56	22.4 (<.0001)	3.27 (0.078)	32.0 (<.0001)
LNCG	11.0 (0.0) ^a	3.0(1.2) ^{acd}	2.0 (0.8) ^{cd}				

Different alphabetic characters in superscripts (e.g., ^a, ^b) within each 3 × 2 comparison denote significant differences (with p's values ranging from <.05 to .001 marked in bold) in post-hoc pairwise contrasts. Cells with any superscript in common do not differ from each other. Means with no superscripts do not differ from any others

Table 2

Peers, Norms, and Social Forces, Stratified By ADHD/LNCG Status and SU/A Group

Peers, Norms, and Social Forces	Abstainers			Desisters			Persisters			Overall Model	ADHD vs LNCG		SU/A Group
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	F (p)	F (p)	F (p)	F (p)
<u># of Positive Role Models with Positive SU/A Impact</u>													
ADHD	1.1 (1.2) ^a	1.1 (0.9) ^a	1.1 (0.9) ^a	1.1 (0.9) ^a	1.1 (0.9) ^a	1.1 (0.9) ^a	1.1 (0.9) ^a	1.1 (0.9) ^a	1.1 (0.9) ^a	5.2 (0.003)	14.8 (0.001)	0.3 (0.70)	
LNCG	2.1 (0.7) ^b	1.9 (0.9) ^b	1.9 (0.9) ^b	1.9 (0.9) ^b	1.9 (0.9) ^b	1.9 (0.9) ^b	1.9 (0.9) ^b	1.9 (0.9) ^b	1.9 (0.9) ^b				
<u># of Negative Role Models with Positive SU/A Impact</u>													
ADHD	0.8 (1.1)	0.8 (1.3)	0.8 (1.3)	0.8 (1.3)	0.8 (1.3)	0.8 (1.3)	0.8 (1.3)	0.8 (1.3)	0.8 (1.3)	1.2 (0.33)	1.6 (0.21)	0.9 (0.43)	
LNCG	1.2 (1.2)	0.6 (1.6)	0.6 (1.6)	0.6 (1.6)	0.6 (1.6)	0.6 (1.6)	0.6 (1.6)	0.6 (1.6)	0.6 (1.6)				
<u># of Negative Role Models with Negative SU/A Impact</u>													
ADHD	NA	0.2 (0.3)	0.3 (0.3)	0.3 (0.3)	0.3 (0.3)	0.3 (0.3)	0.3 (0.3)	0.3 (0.3)	0.3 (0.3)	2.6(0.037)	6.1 (0.016)	1.7 (0.19)	
LNCG	NA	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)				
<u># Peers Who Tried to Help Me Quit</u>													
ADHD	NA	1.2 (1.1)	0.4 (0.5) ^a	1.2 (1.1)	0.4 (0.5) ^a	1.2 (1.1)	0.4 (0.5) ^a	1.2 (1.1)	0.4 (0.5) ^a	3.9 (0.016)	4.4 (0.043)	0.1 (0.77)	
LNCG	NA	1.0 (1.2)	2.0 (1.3) ^b	1.0 (1.2)	2.0 (1.3) ^b	1.0 (1.2)	2.0 (1.3) ^b	1.0 (1.2)	2.0 (1.3) ^b				
<u># Supportive People in life</u>													
ADHD	3.8 (1.4)	3.5 (1.6)	2.1 (1.1) ^b	3.5 (1.6)	2.1 (1.1) ^b	3.5 (1.6)	2.1 (1.1) ^b	3.5 (1.6)	2.1 (1.1) ^b	3.56	9.49 (<0.0001)	16.43 (0.0002)	6.03 (0.004)
LNCG	5.3 (1.1) ^a	4.8 (1.8) ^a	3.9 (1.8)	4.8 (1.8) ^a	3.9 (1.8)	4.8 (1.8) ^a	3.9 (1.8)	4.8 (1.8) ^a	3.9 (1.8)				

Different alphabetic characters in superscripts (e.g., a, b) within each 3 × 2 comparison denote significant differences (with p's values ranging from <.05 to .001 marked in bold) in post-hoc pairwise contrasts. Cells with any superscript in common do not differ from each other. Means with no superscripts do not differ from

Table 3

Self-Efficacy, Stratified By ADHD/LNCG Status and SU/A Group

	Self-Efficacy			Overall Model	F (p)	ADHD vs. LNCG	SU/A Group
	Abstainers	Desisters	Persisters				
Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	df	F (p)	F (p)	F (p)
				3, 56	4.7 (<.001)	0.3 (0.55)	11.4 (<.0001)
ADHD	2.4 (1.4) ^a	1.6 (0.7)	0.8 (0.7) ^b				
LNCG	2.6 (0.9) ^a	1.6 (0.9)	1.0 (1.0) ^b				

* Different alphabetic characters in superscripts (e.g. ^a, ^b) within each 3 × 2 comparison denote significant differences (with p's values ranging from <.05 to .001 marked in bold) in post-hoc pairwise contrasts. Cells with any superscript in common do not differ from each other. Means with no superscripts do not differ from any others.

Table 4

Turning Points, Stratified By ADHD/LNCG Status and SU/A Group

	Stages of Change			Overall Model	F (p)	df	F (p)	SU/A Group
	Abstainers	Desisters	Persisters					
	Mean (SD)	Mean (SD)	Mean (SD)					
# of Negative Turning Points						3, 56	2.4 (0.04)	0.3 (0.57)
ADHD	0.3 (0.5) ^a	1.2 (1.2)	3.6 (2.3) ^b					3.7 (0.030)
LNCG	0.4 (1.0)	2.2 (3.5)	1.4 (1.1)					
# of Positive Turning Points						3, 56	3.19 (0.03)	5.04 (0.03)
ADHD	1.5 (1.1)	2.0 (1.1)	1.0 (0.8) ^b					2.26 (0.11)
LNCG	1.9 (1.7)	2.7 (1.6) ^a	2.1 (1.2)					

* Different alphabetic characters in superscripts (e.g., a, b) within each 3 × 2 comparison denote significant differences (with p's values ranging from <.05 to .001 marked in bold) in post-hoc pairwise contrasts. Cells with any superscript in common do not differ from each other. Means with no superscripts do not differ from any others.