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Interrelationship of Substance Use and Psychological Distress over the Life Course among a Cohort of Urban African Americans

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Abstract

Background—Substance use and psychological problems are major public health issues because of their high prevalence, co-occurrence, clustering in socio-economically disadvantaged groups, and serious consequences. However, their interrelationship over time is not well understood.

Methods—This study identifies and compares the developmental epidemiology from age 6 to 42 of substance use and psychological distress in a population of African American men and women. Data come from the Woodlawn Study, a longitudinal study of an urban community cohort followed since 1966. We use structural equation modeling to examine pathways between substance use (i.e., alcohol, marijuana, and cocaine) and psychological distress over time by gender.

Results—We find significant continuity from adolescence to midlife for substance use and for psychological distress, as well as significant correlations within time periods between substance use and psychological distress, particularly among women. We also find greater adolescent substance use predicts psychological distress in young adulthood for men, but no cross-lag associations for women. Women's adolescent psychological distress and substance use are linked uniquely to that of their mothers. Findings show additional gender differences in the developmental etiology of substance use and psychological distress.

Conclusions—Findings demonstrate the continuity of substance use and psychological distress over time; the contemporaneous relationships between psychological distress and substance use within time periods, and minimal cross-lagged relationships. Findings also show that adolescent substance use may set boys on a pathway of long-term psychological distress, thus adding to evidence of negative consequences of frequent use.

Keywords

African Americans; comorbidity; co-occurrence; longitudinal research; psychological distress; substance use

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1. Introduction

Numerous epidemiological studies have identified comorbidity between psychological distress and substance use, particularly between marijuana, alcohol, and cocaine use and anxiety and depression (Conway et al., 2006; Grant, 1995; Grant et al., 2004; Kessler et al., 2001; Merikangas et al., 1998a; Regier et al., 1990). However, it is unclear whether substance use and psychological distress influence one another over time. Longitudinal investigations of mental health and substance use are rare and have yielded conflicting results. Some have found that earlier substance use predicts later psychological distress but not the converse (Brook et al., 1998; Luthar and Cushing, 1997). Others have found that adolescent psychological distress predicts subsequent substance use, which in turn predicts later psychological distress (Johnson and Kaplan, 1990; McGee et al., 2000). Still others report that shared etiological factors account for most of the association over time between them (Goodman, 2010; Fergusson and Horwood, 1997). Because of the limited longitudinal work in this area, especially from adolescence into midlife, particularly among African American men and women, major gaps exist in understanding of the interrelationship of psychological distress and substance use over the long term.

Research addressing these gaps in African Americans, with added focus on gender differences, is essential. African Americans may demonstrate unique patterns and pathways of substance use and mental health problems compared to other racial/ethnic groups (Brown et al., 2007; Grant, 1997). High levels of social disadvantages and chronic adversities may contribute to increased risk of developing mental health and substance use problems among urban African Americans (Gibbons et al., 2004; Latkin and Curry, 2003; Mulia et al., 2008; Roxburgh, 2009), and may uniquely influence and shape the development of co-occurring psychological distress and substance use throughout the life course (Alegría et al., 2002; Alvidrez, 1999; Amaro, et al., 2005; Garland et al., 2005). Although it has not been studied directly, African Americans may be more at risk of self-medication, with chronic stress and adversity leading to unique patterns of substance use (e.g., escapist drinking; Martin et al., 2003). Previous studies exploring longitudinal trajectories found that African Americans compared to Whites had higher levels of depressive symptoms in early adult life, and were more likely to have symptoms continue through adulthood into midlife (Walsemann, 2009). Further, heavy or increasing substance use in African American adolescents has been linked to psychological and substance use problems in young adulthood (Lynne-Landsman et al., 2010).

1.1. Theoretical Explanations

One explanation for the co-occurrence of psychological and substance use problems is self-medication. That is, individuals use various substances, including alcohol, marijuana and cocaine, to alleviate psychological symptoms (Blume et al., 2000; Khantzian, 1985; Khantzian, 1997; Swendsen et al., 2000; Suh et al., 2008). Another explanation is that substance use leads to psychological distress (Grant et al., 2004; Kadden et al., 1995; Schuckit et al., 1997). Substance use, including intoxication and withdrawal, may induce symptoms of depression and anxiety (Schuckit and Hesselbrock, 1994), which may later spontaneously resolve with the cessation of use and abatement of withdrawal symptoms (Davidson, 1995; Hasin et al., 1996). Further, substance use may lead to psychological distress in the long term because the consequences of use may set an individual on a trajectory of long-term disadvantage (Fergusson and Horwood, 1997; Krohn et al., 1997; Newcomb and Bentler, 1988). Frequent alcohol and marijuana use increases the risk of poor outcomes including educational failure, unemployment, and criminal arrests (Green and

Ensminger, 2006; Green et al., 2010; Staff et al., 2008), which over time may induce psychological distress.

Yet another explanation for the interrelationship is that substance use and psychological distress share etiological factors, such as poor socio-economic resources, familial vulnerability, or behavioral problems. Specifically, low socioeconomic status with neighborhood disadvantage and discrimination has been linked to psychological distress (Adler et al., 1994; Baum et al., 1999; Murphy et al., 1991) and to drug use (Boardman et al., 2001). Parental mental health problems and substance use are often associated with a high risk of these problems in offspring (Davies and Windle, 1997; Merikangas et al., 1998b; Reinherz et al., 2000), possibly because of predisposing genetic factors and unhealthy family relations and environment (Barnow et al., 2002; Pickens et al., 1995). Finally, behavioral problems may predict both substance use and psychological distress; strong associations have been reported between childhood conduct problems and adolescent psychological problems and substance use (Clark et al., 1997; Miller-Johnson et al., 1998).

1.2. Gender Differences

Men typically have higher rates of substance use disorders (Hasin et al., 2007; Kessler et al., 1994), and women, higher rates of depression and anxiety (Grant et al., 2005; Kessler et al., 1993; Kuehner, 2003). It is less clear if there are gender differences in comorbidity; some evidence suggests that women are more likely to have co-occurring substance use and internalizing disorders (Compton et al., 2000; Kessler et al., 1997), but others have not found this difference (Brook et al., 1998). Women may also be more likely to self-medicate for depressive symptoms (Henry et al., 1993; Weiss et al., 1992); however, men may be more likely to self-medicate to relieve anxiety (Cox et al., 1993; Swendsen et al., 2000). There is also evidence that substance use disorders precede the onset of mood disorders for men (Kessler et al., 1996), while the opposite has been observed for women (Kessler et al., 2001). Pathways to substance use and psychological problems have also shown gender differences, with male substance use more rooted in externalizing behaviors (Chassin et al., 2002; Windle et al., 1990), and female substance use more rooted in environmental adversity (Jang et al., 1997; Wassilow-Mueller and Erickson, 2001; Wilsnack and Wilsnack, 1995). Evidence, though, suggests similar etiology factors for psychological problems for both males and females, including family history and childhood adversity (Hettema et al., 2005; Reinherz et al., 2003).

1.3. Research Questions

The purpose of this study is to examine pathways between psychological distress and substance use over the life course in a community cohort of urban African Americans followed from age 6 to 42. Multiple gaps in the literature are addressed by exploring interrelationships over a significant portion of the life course, considering multiple substances in a single model, and examining men and women separately. Specific research questions are:

1. How are substance use and psychological distress interrelated in adolescence, young adulthood and midlife?
2. Does substance use predict later psychological distress, controlling for earlier risk?
3. Does psychological distress predict later substance use, controlling for earlier risk?
4. Are there gender-specific developmental etiological pathways to psychological distress and substance use?

2. Methods

2.1. The Woodlawn Project

Data come from the Woodlawn Project, a longitudinal study of urban African Americans first assessed in 1966, as first graders. Families of essentially all first grade students in the Woodlawn community area of Chicago participated in the project (N=1242, 13 families declined). Teachers and mothers provided information on children's behavior, school achievement, psychological well-being, activities, family life, and home environment. In adolescence (age 15–16, 1975), 939 mothers were interviewed, and 705 adolescents participated in group-based assessment of psychological and physical well being, substance use, and deviant behavior. In young adulthood (age 32–33, 1992–3), 952 participants were interviewed extensively. In midlife (age 42–43, 2002–3), 833 participants were interviewed. Attrition analyses found no differences on key variables (gender, mothers' education, or early childhood behavior) between those with and without an adult interview. Those interviewed in adulthood were more likely to be high school graduates and less likely to have been in poverty in first grade or adolescence. Mothers not interviewed in 1975 were more likely to have started childbearing as teenagers and moved more often before and during the child's first grade year; there were no differences in other aspects of family background or children's behavior. Teenagers not interviewed did not differ in their first grade teachers' ratings of classroom behavior or psychological characteristics. More detailed descriptions of the study and attrition analyses are presented elsewhere (Crum et al., 2006; Ensminger et al., 2002; Ensminger et al., 2009; Kellam et al., 1975).

2.2. Measures

With the exception of alcohol use in young adulthood, all variables are latent constructs. Table 1 (childhood and adolescence) and Table 2 (young and mid adulthood) provide mean values and standard deviations by gender for endogenous variables along with their factor loadings (all statistically significant). We coded variables so higher scores indicate more dysfunction.

2.2.1. Early Contextual Measures—*Mothers' psychological distress* consists of two items from the first grade interview eliciting self-reports of frequency of feeling anxious and feeling sad (Brown et al., 1981). Each item ranges from 0 to 3 (hardly ever, occasionally, fairly often, and very often). *Low socioeconomic status* consists of mothers' years of education (1=more than 12 years, 2=12 years, 3=9 to 11 years, and 4=0 to 8 years) and family income for 1965 (1= \$8,000, 2=\$5,000 to \$7,999, 3=\$3,000 to \$4,999, and 4=< \$3,000).

2.2.2. First Grade Measures—Teachers rated children's classroom adaptation (*poor classroom behavior*) in four areas: immaturity, restlessness, aggressiveness, and conduct, each coded 0 to 3 (adapting to severely maladapting for the first three characteristics, and excellent to unsatisfactory for conduct). Each *psychological distress* construct (one from mothers and one from teachers) comprises the same five items describing to what extent the child: fears people, being alone, and new situations; looks sad, and cries for unexplained reasons (0=not at all to 3=a great deal) (Conners, 1967). *School performance* is indicated by teachers' assessment of academic performance in reading and arithmetic (1=excellent to 4=unsatisfactory).

2.2.3. Adolescence Measures—*Adolescent psychological distress* consists of self-reported emotional reactions "over the past several weeks" to 13 items (listed in Table 1) on the anxiety and depression scales of *How I Feel* (1=not at all to 6=very, very much, $\alpha=.79$) (Petersen and Kellam, 1977). *Adolescent substance use* comprises self-reported frequency

(1=never to 6=40 or more times) and age of onset of using beer/wine, hard liquor, and marijuana (1=never to 6=age 8 or younger). In factor analysis alcohol and marijuana load on a single construct, which is theoretically appropriate given the illegality of both substances at age 16.

Mothers' substance use comprises three indicators—frequency of past year use of beer/wine, hard liquor, and cigarettes (0=never, 1=once or twice, 2=occasionally, 3=on a regular basis). Mothers' illegal drug use was not included because of its rarity. *Mothers' psychological distress* at adolescence is a construct identical to that from first grade assessing self-reports of frequency of feeling anxious and sad.

2.2.4. Young Adulthood Measures—From self reports at age 32, we developed a construct of *psychological distress*, comprising seven items repeated from the adolescent assessment (Petersen and Kellam, 1977) and on the same scale ($\alpha=.85$) assessing the degree to which they feel nervous, tense, under pressure, tight inside, tense in new situations, have hands that sometimes shake, and startle easily. *Young adult drug use* consists of four observed variables: frequency in the past year and recency of use of marijuana and cocaine. Frequency reports range from 0 (never) to 8 (daily), and recency is 0=never/more than a year ago, 1=in the past year, 2=in the past six months, and 3=in the past month. *Young adult alcohol use*, an observed variable, is how many drinks a person had on days when they were drinking the most in the past year (0=none to 4=>10 drinks). Alcohol use is modeled separately since it loaded poorly on the drug use construct and differed theoretically because of its legality.

2.2.5. Midlife Measures—*Psychological distress* ($\alpha=.85$) and *midlife drug use* are identical in composition to their counterparts from young adulthood. *Midlife alcohol use* comprises two indicator variables: frequency of use in the past year (0=never to 5=nearly daily), and the most alcohol consumed per day in the past year (range, 0 to 48 drinks).

2.3. Analysis

Structural equation models (Amos v19.0) are constructed to examine pathways between each successive period along the life course for both psychological distress and substance use. These models allow examination of continuity over time (e.g., substance use to substance use) and cross-lag relationships (e.g., psychological distress to substance use). The need for separate models for men and women was confirmed by testing multi-group invariance. Numerous measurement models varied by gender, including adolescent substance use and psychological distress, and all adult constructs of drug use and psychological distress. Therefore, separate models are run for men (N=606) and women (N=636) and non-significant paths are retained to maintain identical models. Model fit is evaluated using the root mean-squared error of approximation (RMSEA) and the ratio of the chi-square to the degrees of freedom (cmin/df). Good model fit is defined by RMSEA of .05 or less and cmin/df between 2 and 5 (Bollen and Long, 1993). To handle missing data and reduce bias, we employ maximum likelihood estimation, which takes into account varying sample sizes for different constructs (Arbuckle, 1996).

3. Results

3.1 Psychological Distress and Substance Use among Men

Figure 1 shows the statistically significant pathways and correlations between psychological distress and substance use for men. Correlations are included in Table 3; full pathway estimates are shown in Table 4. Fit statistics are acceptable (RMSEA=.044, cmin/df=2.18).

3.1.1. Contemporaneous associations for men—Table 3 shows that at first grade, poor school performance is associated with both mother and teacher reports of psychological distress ($r=0.266$ and $r=0.214$, respectively); poor classroom behavior is related to teacher reports of psychological distress ($r=0.408$). We find statistically significant positive correlations between psychological distress in young adulthood and both alcohol use ($r=0.113$) and drug use ($r=0.145$), as well as between drug and alcohol use ($r=0.323$). At the midlife assessment, psychological distress is unrelated to alcohol and drug use, which are related to one another ($r=0.284$).

3.1.2. Effects over the life course for men—We find significant continuity in psychological distress from adolescence, through young adulthood, into midlife. Boys with more psychological distress during adolescence have more psychological distress in young adulthood ($\beta=0.204$), leading to more psychological distress in midlife ($\beta=0.252$). Similarly, boys with greater substance use in adolescence have greater drug use in young adulthood ($\beta=0.189$), leading to greater drug use in midlife ($\beta=0.461$). Substance use in adolescence does not predict alcohol use in young adulthood, but alcohol use in young adulthood predicts alcohol use in midlife ($\beta = 0.361$). Poorer first grade classroom behavior predicts greater adolescent substance use ($\beta=0.207$); however, teacher-rated first grade psychological distress predicts *less* substance use ($\beta=-0.183$).

We find that adolescent boys with greater substance use have more psychological distress in young adulthood ($\beta=0.139$)—a cross-lag effect. More psychological distress for adolescent boys predicts less drinking in young adulthood ($\beta = -0.138$) but is unrelated to drug use. No significant paths were found from young adult psychological distress to midlife drug or alcohol use, nor were paths found from young adult drug or alcohol use to midlife psychological distress.

3.2 Psychological Distress and Substance Use among Women

Figure 2 presents the statistically significant associations between psychological distress and substance use for women. Correlations are included in Table 3; full pathway estimates are shown in Table 4. Fit statistics are acceptable (RMSEA=.044, $cmin/df=2.24$).

3.2.1. Contemporaneous associations for women—First grade constructs that are correlated for boys are also significantly correlated for girls (see Table 3). Unlike boys, substance use and psychological distress are significantly correlated for adolescent girls ($r=0.165$). Psychological distress, in young adulthood, is related to drug use only ($r=0.106$), and, in midlife, to alcohol use only ($r=0.290$). As with men, alcohol and drug use are significantly correlated within each adult period ($r=0.257$ for young adulthood, $r=0.293$ for midlife).

3.2.2. Effects over the life course for women—As with men, we find significant continuity in substance use over time. Adolescent substance use predicts (1) young adult drinking ($\beta=0.276$), which predicts midlife drinking ($\beta=0.267$), as well as (2) young adult drug use ($\beta=0.181$), which predicts midlife drug use ($\beta=0.481$). Unlike men, women have significant pathways between alcohol and drug use over time. Adolescent girls' substance use is predicted by *better* first grade school performance ($\beta=-0.176$), as well as maternal substance use in adolescence ($\beta=.165$).

Significant effects of psychological distress over the life course uniquely begin in childhood for women. Maternal psychological distress in childhood predicts maternal psychological distress in adolescence ($\beta=.390$), which predicts adolescent girls' psychological distress ($\beta=.184$), which predicts young adult psychological distress ($\beta=0.309$), leading to midlife

psychological distress ($\beta=0.396$). No long-term pathways between substance use and psychological distress are statistically significant.

4. Discussion

Examining the interrelationship of substance use and psychological distress from adolescence (age 16) to midlife (age 42), and the continuity of each over time among a cohort of African Americans, we find significant continuity from adolescence to midlife for drug and alcohol use and psychological distress for both men and women, confirming results from predominantly White samples (Gregory et al., 2007; Newcomb et al., 1993; Pine et al., 1999). Early substance use sets individuals on a trajectory of long-term use, and early psychological distress leads to continued symptomology over time. While we were unable to incorporate mental health and substance abuse treatment into our models, African Americans, in particular, have been shown to have excess treatment needs (Alegria et al., 2002; Alvidrez et al., 1999; Garland et al., 2005), and lack of treatment may partly explain the continuity. Findings reinforce the importance of prevention and intervention programs early in the life course.

This study makes significant contributions to the understanding of gender differences in substance use and psychological distress as few previous studies have assessed gender differences explicitly (Poulin, et al., 2005). We found that, for men only, substance use at age 16 relates directly to psychological distress at age 32 (cross-lag), even after taking into account earlier psychological distress. This extends previous work in clinical populations suggesting substance use as a potential cause, not a consequence, of anxiety (Allan, 1995). Adolescent substance use, therefore, may set boys on a long-term course of psychological distress. Previous research with the Woodlawn population found unemployment to be a consequence of heavy adolescent substance use (Green and Ensminger, 2006; Green et al., 2011), which may be the mechanism driving the long-term association between adolescent substance use and adult psychological distress. Previously, unemployment was found to be particularly relevant in the interrelationship between psychological distress and substance use for African American men (Brunswick et al., 1992). Other work has also identified unemployment to be an important precursor of psychological distress (Paul and Moser, 2009), and therefore, an important area of future study.

For women, we find no evidence of cross-lag effects. Instead, we see only significant contemporaneous relationships at each time period, which are present for men only in young adulthood. Thus, by considering multiple developmental stages, the finding of stronger co-occurrence of psychological distress and substance use for women may explain conflicting findings in the literature regarding gender differences in the prevalence of co-occurring internalizing and substance use problems (Poulin et al., 2005). Moreover, self-medication may be a short-term coping mechanism, but it falls short of positioning women (and men) in this population at increased risk of long-term substance use, supporting findings of Brunswick and colleagues (1992). Similarly, substance use may induce psychological distress temporarily (Schuckit and Hesselbrock, 1994), especially for women, but it does not seem to set these women on a long-term trajectory of distress as seen in men. Instead, for women, drug use increases the risk of later alcohol use, which increases the risk of later drug use. This is not found for men, suggesting that men may be more specialized in their substance use, while women's use may be more tied to contextual factors (Jang et al., 1997).

Another important finding is the differential etiology of substance use and psychological distress for men and women, which is consistent with some previous work (Henry et al., 1993; Repetto et al., 2008). An exception is low SES early in life, which seems to drive multiple, negative outcomes for both girls and boys. However, overall, men and women

show different early risk factors. For girls only, maternal substance use predicts daughters' substance use and maternal psychological distress predicts daughters' psychological distress, extending previous work linking maternal history of psychological distress and major depressive disorder in daughters only (Ensminger et al., 2003). For boys only, poor school performance in childhood predicts adolescent psychological distress, so for males, poor social adaptation early in life seems to have long lasting consequences (Ensminger et al., 2003), since we find this continuity in psychological distress through midlife. Poor classroom behavior predicts more adolescent substance use, consistent with literature on life course theories of male risk development over the long term (Farrington and Painter, 2004; Moffitt et al., 2001).

Interestingly, first grade teacher ratings of *less* psychological distress predict adolescent substance use for boys. We speculate that teachers' ratings of psychological distress in childhood may be driven by withdrawn behavior and social inhibition, which have been found to be inversely related to deviance in adolescence (Kerr et al., 1997). Similarly, for girls, it is *better* academic performance in first grade that predicts adolescent substance use. These findings together build upon the work of others who have found well-adjusted youth to be the first to experiment with substances (Block et al., 1998; Fleming et al., 1982). Better performing first graders have also been found to be more likely to desist by adulthood when substance use is less normative (Ensminger et al., 2002).

Some considerations are important when interpreting these findings. The first involves the measures. Assessment of adult psychological distress is limited to symptoms of anxious mood, thus, we did not examine the relationship between depressive symptoms and substance use after adolescence. Previous work shows depressive and anxious symptoms to be highly correlated (Lovibond and Lovibond, 1995; Moffitt et al., 2007) so we hypothesize these findings would also show for depressive symptoms in adulthood, but this needs to be tested. Also, though validated by Conner (1967), mother and teacher reports of children's psychological distress in first grade are from 1966, before more established measures of childhood mental health were developed. They are not correlated, as expected, and neither predicts adolescent psychological distress, in contrast with previous work showing mother's ratings of childhood psychological distress to be related to adolescent symptoms (Lambert, 1988). Moreover, because teacher ratings of mental health are correlated with their ratings of classroom behavior and academic performance, teachers' perceptions of children's psychological distress may reflect the child's performance in the classroom rather than an independent measure of mental health. However, it remains a strength of the study to have parental, teacher, and self-reports of psychological distress, as self-reports alone may be biased. Also, while it is a strength of the study to have prospectively gathered data over 35 years, the significant interval between assessments (10–15 years) may mask more proximate influences of psychological distress on substance use and vice versa.

Another consideration is the generalizability of findings. The Woodlawn cohort represents a disadvantaged African American population growing up in an urban center in the 1960s and 1970s, when the negative consequences of substance use were less well-established and rates of substance use were particularly high for adolescents. Thus, future work is needed to determine how well these findings generalize to other populations. Nonetheless, research on this population is highly significant since African Americans are often underrepresented in household surveys due to high rates of residential instability and incarceration, and evidence shows that they are disproportionately burdened by drug use and psychological distress later in life (French et al., 2002; Jang et al., 2005; Skarupski et al., 2005). Further, a cohort study of this type builds into its design controls for childhood neighborhood, age, and race, allowing for the exploration of pathways among a well-defined population over time.

In summary, this study is rare in its ability to map the interrelationship between substance use and psychological distress for African American men and women from ages 6 to 42 and identify gender differences in pathways, and thus potential differences in prevention targets by gender. The findings suggest that an important etiological influence on psychological distress and substance use into midlife for males is social role failure in childhood, which prevention programs should prioritize for boys. One unique finding for women is that maternal psychological distress and substance use influences these problems in their daughters. Thus, this intergenerational transmission is a critical target for prevention work for girls.

The significant contemporaneous relationships found between substance use and psychological distress suggest the need to screen for both problems. Previous work shows that African Americans have a high risk of undetected mental health and substance use problems, low rates of treatment referral (Hu et al., 2006, Wells et al., 2001), and are overrepresented in public, community-based support programs like Alcoholics Anonymous (Kaskutas et al., 1999). Thus, screening in community settings, including general health services, school, and churches where African Americans may be likely to attend, is critical, particularly for women at all life stages and men in young adulthood.

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Note: Solid lines indicate statistically significant pathways with positive associations ($p < .05$).
Dashed line indicates statistically significant pathways with negative associations ($p < .05$).
Curved, bi-directional lines indicate statistically significant *positive* correlations ($p < .05$).
Curved, bi-directional dashed line indicates a statistically significant *negative* correlation ($p < .05$).

Figure 1.
Significant associations in the developmental epidemiology and interrelationship of substance use and psychological distress over the life course for men in the Woodlawn Study (N=606) from structural equation modeling.

Note: Solid lines indicate statistically significant pathways ($p < .05$).
Dashed line indicates a statistically significant pathway with negative association ($p < .05$).
Curved, bi-directional lines indicate statistically significant *positive* correlations ($p < .05$).

Figure 2.

Significant associations in the developmental epidemiology and interrelationship of substance use and psychological distress over the life course for women in the Woodlawn Study (N=636) from structural equation modeling.

Table 1

Descriptives and Factor Loadings for Study Variables from First Grade (age 6) and Adolescence (age 16)

Latent Variables and Observed Indicators (Range)	<u>Men</u>		<u>Women</u>	
	M, SD	Factor Loading	M, SD	Factor Loading
<i>Early Contextual Variables</i>				
Mothers' Psychological Distress-Self Reports (0–3)				
How often nervous, tense?	1.4, 1.0	0.61	1.4, 1.0	0.76
How often sad, blue?	0.9, 0.9	0.66	0.8, 0.9	0.62
Low SES-Mothers' Self Reports (1–4)				
Household income	2.6, 1.0	0.54	2.6, 1.1	0.46
Mothers' years of education	2.7, 0.8	0.51	2.6, 0.9	0.59
<i>First Grade Variables</i>				
Poorer Classroom Behavior-Teachers' Reports (0–3)				
Immaturity	0.7, 1.0	0.73	0.6, 0.9**	0.67
Restlessness	0.7, 1.1	0.90	0.4, 0.9**	0.90
Aggressiveness	0.7, 1.0	0.78	0.4, 0.8**	0.72
Conduct	1.5, 0.8	0.55	1.1, 0.8**	0.56
Psychological Distress-Teachers' Reports (0–3)				
Afraid of people	0.2, 0.7	0.89	0.2, 0.6	0.90
Afraid of being alone	0.2, 0.6	0.81	0.2, 0.5	0.76
Afraid of new situations	0.3, 0.7	0.90	0.3, 0.7	0.90
Looks sad	0.4, 0.8	0.65	0.3, 0.7	0.58
Cries for unexplained reasons	0.2, 0.6	0.61	0.2, 0.6	0.58
Psychological Distress-Mothers' Reports (0–3)				
Afraid of people	0.1, 0.3	0.34	0.2, 0.4**	0.45
Afraid of being alone	0.5, 0.8	0.36	0.7, 0.9**	0.49
Afraid of new situations	0.3, 0.5	0.42	0.3, 0.6	0.53
Looks sad	0.3, 0.6	0.53	0.3, 0.6	0.44
Cries for unexplained reasons	0.2, 0.6	0.47	0.3, 0.6	0.36
Poorer School Performance-Teachers' Reports (1–4)				
Arithmetic grade	2.6, 0.8	0.87	2.5, 0.8*	0.87
Reading grade	2.8, 0.8	0.86	2.4, 0.8**	0.85
<i>Adolescence Variables</i>				
Mothers' Psychological Distress-Self Reports (0–3)				
How often nervous, tense?	1.1, 1.0	0.78	1.1, 0.9	0.75
How often sad, blue?	0.7, 0.8	0.67	0.7, 0.8	0.77
Mothers' Substance Use-Self Reports (0–3)				

Latent Variables and Observed Indicators (Range)	Men		Women	
	M, SD	Factor Loading	M, SD	Factor Loading
Frequency used beer or wine in past year	1.0, 1.1	0.62	1.0, 1.1	.60
Frequency used hard liquor in past year	0.9, 1.0	0.58	0.8, 1.0	.65
Frequency of smoking in past year	1.5, 1.4	0.49	1.3, 1.4	.37
Psychological Distress-Self Reports (1–6)				
I feel nervous	2.4, 1.6	0.49	2.6, 1.7	0.47
I feel under pressure	2.4, 1.7	0.52	2.6, 1.7	0.58
I feel tense	2.4, 1.6	0.61	2.7, 1.7	0.68
My hands sometimes shake	2.9, 1.8	0.32	3.5, 1.9***	0.37
New situations make me tense	3.1, 1.6	0.32	3.1, 1.6	0.47
I feel tight inside	2.0, 1.4	0.61	1.9, 1.4	0.52
I startle easily	2.5, 1.4	0.40	3.2, 1.6***	0.28
I feel hopeless	1.6, 1.3	0.65	1.9, 1.5*	0.61
I feel guilty	1.9, 1.4	0.54	1.9, 1.4	0.46
I feel ashamed of myself	1.8, 1.4	0.55	1.6, 1.1*	0.44
I feel sad	1.9, 1.5	0.46	2.2, 1.6*	0.50
I cry and don't know why	1.5, 1.2	0.52	2.0, 1.6**	0.50
People would be better off without me	2.0, 1.4	0.44	1.9, 1.4	0.42
Substance Use-Self Reports (1–6)				
Frequency ever used beer or wine	3.6, 1.8	0.78	2.8, 1.6**	0.82
Age at first use of beer or wine	3.2, 1.5	0.40	2.9, 1.5**	0.57
Frequency ever used hard liquor or whiskey	2.2, 1.6	0.72	1.8, 1.3**	0.79
Age at first use of hard liquor or whiskey	2.0, 1.2	0.59	1.8, 1.1*	0.71
Frequency ever used marijuana or hashish	3.4, 2.0	0.76	2.4, 1.7**	0.71
Age at first use of marijuana or hashish	2.2, 1.1	0.69	1.8, 0.9**	0.68

*
 $p < .05$;

**
 $p < .01$ highlighting statistically significant differences in means between men and women based on a t-test.

Table 2

Descriptives and Factor Loadings of Study Variables from Young Adulthood (age 32) and Mid Adulthood (age 42)

Latent Variables and Observed Indicators (Range)	Men		Women	
	M, SD	Factor Loading	M, SD	Factor Loading
<i>Young Adulthood Variables</i>				
Psychological Distress (1–6)				
I feel nervous	1.6, 1.1	0.81	1.8, 1.1 **	0.72
I feel under pressure	2.0, 1.4	0.71	2.2, 1.4 *	0.73
I feel tense	1.8, 1.2	0.82	1.9, 1.2	0.79
My hands sometimes shake	1.5, 1.0	0.65	1.4, 0.8	0.56
New situations make me tense	1.9, 1.1	0.60	2.0, 1.2	0.60
I feel tight inside	1.5, 1.1	0.74	1.5, 1.0	0.67
I startle easily	1.4, 0.9	0.61	1.7, 1.2 **	0.48
Maximum Alcoholic Drinks Per Day Past Year (0–4)^a	1.4, 1.4	-	0.9, 1.1 **	-
Drug Use Past Year				
Frequency of Marijuana Use (0–8)	1.3, 2.5	0.95	0.7, 1.9 **	0.94
Recency of Marijuana Use (0–3)	0.6, 1.1	0.95	0.4, 1.0 **	0.96
Frequency of Cocaine Use (0–8)	0.6, 1.8	0.44	0.3, 1.4 *	0.49
Recency of Cocaine Use (0–3)	0.3, 0.8	0.43	0.2, 0.7 *	0.55
<i>Mid Adulthood Variables</i>				
Psychological Distress (1–6)				
I feel nervous	1.6, 1.1	0.71	1.7, 1.3	0.80
I feel under pressure	2.0, 1.4	0.69	2.2, 1.6 *	0.70
I feel tense	1.7, 1.1	0.74	2.1, 1.5 **	0.74
My hands sometimes shake	1.3, 0.8	0.45	1.4, 1.0 *	0.65
New situations make me tense	1.8, 1.1	0.51	2.1, 1.4 **	0.67
I feel tight inside	1.3, 0.8	0.72	1.6, 1.1 **	0.77
I startle easily	1.4, 0.9	0.54	1.8, 1.3 **	0.50
Alcohol Use Past Year				
Frequency (0–5)	2.0, 1.7	0.86	1.3, 1.4 **	0.79
Amount per day (0–30)	1.9, 3.2	0.71	0.9, 2.0 **	0.84
Drug Use Past Year				
Frequency of Marijuana Use (0–8)	0.5, 1.5	0.86	0.3, 1.2	0.87
Recency of Marijuana Use (0–4)	0.7, 1.2	0.94	0.5, 1.1 **	0.88
Frequency of Cocaine Use (0–8)	0.2, 1.0	0.36	0.1, 0.9	0.46
Recency of Cocaine Use (0–4)	0.4, 0.9	0.44	0.2, 0.7 **	0.61

*
 $p < .05$;

**
 $p < .01$ highlighting statistically significant differences in means between men and women based on a t-test.

^aThis variable is observed.

Table 3

Correlations between Variables by Gender within Data Collection Time Periods

	Men Correlations	Women Correlations
<i>Early Contextual Variables^a</i>		
Mothers' Mental Health (M) ↔ Early SES (M)	0.339 ***	0.295 ***
<i>First Grade Variables</i>		
1 st Grade Mental Health (M) ↔ 1 st Grade Child Mental Health (T)	0.069	0.066
1 st Grade Mental Health (M) ↔ 1 st Grade School Performance (T)	0.266 **	0.142 *
1 st Grade Mental Health (M) ↔ 1 st Grade Behavior (T)	0.032	0.010
1 st Grade Mental Health (T) ↔ 1 st Grade School Performance (T)	0.214 ***	0.203 ***
1 st Grade Mental Health (T) ↔ 1 st Grade Behavior (T)	0.408 ***	0.343 ***
1 st Grade School Performance (T) ↔ 1 st Grade Behavior (T)	0.382 ***	0.397 ***
<i>Adolescent Variables</i>		
Adolescent Psych Distress ↔ Adolescent Drug Use	-0.122 ^	0.165 *
Mother's Psych Distress at Adol ↔ Mother's Drug Use at Adol	0.238 **	0.111
<i>Young Adult Variables</i>		
Young Adult Psych Distress ↔ Young Adult Alcohol Use	0.113 *	0.070
Young Adult Psych Distress ↔ Young Adult Drug Use	0.145 **	0.106 *
Young Adult Alcohol Use ↔ Young Adult Drug Use	0.323 ***	0.257 ***
<i>Midlife Variables</i>		
Midlife Psych Distress ↔ Midlife Alcohol Use	-0.048	0.290 ***
Midlife Psych Distress ↔ Midlife Drug Use	0.048	0.097 ^
Midlife Alcohol Use ↔ Midlife Drug Use	0.284 ***	0.293 ***

^aM=Mother Report; T=Teacher Report; all other variables are self reports.^
 $p < .10$;*
 $p < .05$;**
 $p < .01$;***
 $p < .001$

Table 4

Parameter Estimates for the Structural Model by Gender: Unstandardized (b) with Standard Errors, Standardized (β) and Statistical Significance Levels

<i>Early Contextual Variables with First Grade and Adolescent Variables^a</i>	Men		Women	
	b (SE)	β	b (SE)	β
Mothers' Psych Distress → 1 st Grade Psych Distress (M)	.075 (.022)***	.393	.102 (.030)***	.276
Mothers' Psych Distress → 1 st Grade Psych Distress (T)	.049 (.065)	.050	-.056 (.054)	-.061
Mothers' Psych Distress → 1 st Grade School Perf (T)	.031 (.081)	.027	.021 (.083)	.016
Mothers' Psych Distress → 1 st Grade Behavior (T)	-.060 (.050)	-.083	-.002 (.047)	-.002
Mothers' Psych Distress → Adolescent Psych Distress	.080 (.123)	.075	.083 (.098)	.077
Mothers' Psych Distress → Adolescent Substance Use	-.195 (.265)	-.084	.298 (.221)	.121
Mothers' Psych Distress → Mothers' Substance Use at Adol (M)	-.003 (.093)	-.003	.081 (.101)	.067
Mothers' Psych Distress → Mothers' Psych Distress at Adol (M)	.451 (.114)***	.361	.480 (.102)***	.390
SES → 1 st Grade Psych Distress (M)	-.074 (.031)*	-.282	-.014 (.034)	-.037
SES → 1 st Grade Psych Distress (T)	.160 (.104)	.116	.128 (.071) [^]	.130
SES → 1 st Grade School Performance (T)	.443 (.142)**	.282	.496 (.135)***	.360
SES → 1 st Grade Classroom Behavior (T)	.211 (.084)*	.212	.197 (.069)**	.240
SES → Adolescent Psych Distress	.070 (.180)	.047	-.008 (.115)	-.007
SES → Adolescent Substance Use	.310 (.393)	.097	-.471 (.274) [^]	-.182
SES → Mothers' Substance Use at Adol (M)	.142 (.142)	.099	-.081 (.121)	-.063
SES → Mothers' Psych Distress at Adol (M)	.231 (.155)	.133	.027 (.107)	.021
<i>First Grade Variables with Adolescent Variables</i>				
1 st Grade Psych Distress (M) → Adolescent Psych Distress	-.318 (.579)	-.057	.442 (.242) [^]	.152
1 st Grade Psych Distress (M) → Adolescent Substance Use	-.219 (1.248)	-.018	-.424 (.519)	-.064
1 st Grade Psych Distress (T) → Adolescent Psych Distress	.000 (.073)	.000	-.006 (.073)	-.005
1 st Grade Psych Distress (T) → Adolescent Substance Use	-.426 (.159)**	-.183	.002 (.162)	.001
1 st Grade School Perf (T) → Adolescent Psych Distress	.194 (.083)*	.207	.093 (.067)	.113
1 st Grade School Perf (T) → Adolescent Substance Use	-.178 (.172)	-.087	-.331 (.148)*	-.176
1 st Grade Behavior (T) → Adolescent Psych Distress	-.004 (.114)	-.003	.066 (.101)	.047
1 st Grade Behavior (T) → Adolescent Substance Use	.669 (.253)**	.207	.065 (.226)	.021
<i>Mothers with Adolescents at Focal Child's Adolescence</i>				
Mothers's Substance Use at Adol → Adolescent Psych Distress	-.170 (.087) [^]	-.165	-.008 (.065)	-.010
Mothers's Substance Use at Adol → Adolescent Substance Use	.103 (.180)	.046	.334 (.152)*	.165
Mothers's Psych Distress at Adol → Adolescent Psych Distress	.078 (.075)	.091	.161 (.070)*	.184
Mothers's Psych Distress at Adol → Adolescent Substance Use	.053 (.160)	.029	.006 (.148)	.003
<i>Adolescent Variables with Young Adult Variables</i>				
Adolescent Psych Distress → Young Adult Psych Distress	.275 (.095)**	.204	.430 (.104)***	.309

	<u>Men</u>		<u>Women</u>	
	b (SE)	β	b (SE)	β
<i>Early Contextual Variables with First Grade and Adolescent Variables^a</i>				
Adolescent Psych Distress → Young Adult Alcohol Use	-.311 (.147) *	-.138	-.023 (.111)	-.012
Adolescent Psych Distress → Young Adult Drug Use	.040 (.240)	.011	.202 (.191)	.065
Adolescent Substance Use → Young Adult Psych Distress	.087 (.041) *	.139	-.002 (.037)	-.004
Adolescent Substance Use → Young Adult Alcohol Use	.092 (.065)	.088	.229 (.047) ***	.276
Adolescent Substance Use → Young Adult Drug Use	.325 (.110) **	.189	.247 (.081) **	.181
<i>Young Adult Variables with Midlife Variables</i>				
Young Adult Psych Distress → Midlife Psych Distress	.229 (.059) ***	.252	.486 (.071) ***	.396
Young Adult Psych Distress → Midlife Alcohol Use	-.020 (.108)	-.011	.040 (.075)	.029
Young Adult Psych Distress → Midlife Drug Use	-.055 (.085)	-.037	-.077 (.067)	-.057
Young Adult Alcohol Use → Midlife Psych Distress	.038 (.034)	.070	-.027 (.047)	-.030
Young Adult Alcohol Use → Midlife Alcohol Use	.369 (.065) ***	.361	.276 (.055) ***	.267
Young Adult Alcohol Use → Midlife Drug Use	-.044 (.050)	-.049	.165 (.048) ***	.167
Young Adult Drug Use → Midlife Psych Distress	-.031 (.021)	-.095	.034 (.029)	.061
Young Adult Drug Use → Midlife Alcohol Use	.068 (.040) ^	.109	.223 (.035) ***	.356
Young Adult Drug Use → Midlife Drug Use	.249 (.033) ***	.461	.290 (.031) ***	.481

^aM=Mother Report, T=Teacher Report; all other variables are self reports.

^
p<.10;

*
p<.05;

**
p<.01;

p<.001