



Adolescent measures of family socioeconomic status: Reliability, validity, and effects on substance use behaviors in adolescence and young adulthood

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ABSTRACT

Socioeconomic status (SES) is a robust predictor of health disparities in adolescence and early adulthood, yet obtaining accurate and reliable measurements of family SES from younger participants remains a challenge. We evaluated the reliability and validity of a subjective SES measure, i.e., perceived family financial security (PFS), which assesses adolescents' perceptions of whether their family has enough money to meet their needs. We also examined the predictive associations of PFS and parental education (adolescent reports) with alcohol, marijuana, and tobacco use during adolescence and young adulthood. Longitudinal data were obtained from 593 parent-child dyads in the Pacific Northwest region of the United States, who were assessed eight times between 2005 and 2014. Present analyses included data from four annual assessments conducted when the participating children were adolescents (age range = 10.25–16.33 years) and a final follow-up in young adulthood (age range = 20–23.42 years). PFS had good test-retest reliability and convergent validity with other parent and adolescent reported SES measures. Adolescent-reported PFS significantly predicted tobacco use frequency in young adulthood, whereas adolescent-reported parental education predicted alcohol use frequency. PFS was not a significant predictor of alcohol or marijuana use. Findings suggest that PFS can be a psychometrically sound measure to assess a unique dimension of SES in adolescent samples, with differential predictive associations among substance use outcomes in young adulthood compared to more traditional measures like parental education. Future research should evaluate the psychometric properties and utility of PFS as a complementary SES measure.

1. Introduction

Substance use onset typically happens in adolescence, with a strong link between early-onset and later dependence (Grant and Dawson, 1997). Although socioeconomic disparities are predictive of substance use disorders (Diala et al., 2004; Melchior et al., 2007), less is known about the relation between socioeconomic status (SES) and early substance use patterns before dependency. Unlike the consistent and cumulative effect of SES on mental health and other developmental outcomes (Kramer et al., 2017), the direction and strength of its association with adolescent substance use is inconsistent and can be measure- and substance-specific (Hanson and Chen, 2007; Quon and McGrath, 2014). Although parent reports of family SES tend to be more accurate as compared to adolescent reports (Ensminger et al., 2000; Goodman et al., 2001), recruiting and retaining parents for longitudinal studies can be challenging (Koerting et al., 2013). Hence, studies often rely on adolescent-reported family SES, using traditional measures like parental education and income (e.g., Hollingshead, 1975). Given the

critical role of SES as a predictor of health disparities, age-appropriate and psychometrically sound measures are needed for adolescent samples. This study used a large, diverse, longitudinal sample of adolescents to test the reliability and validity of one such developmentally appropriate, subjective family SES measure and examined its predictive associations with substance use in adolescence and young adulthood.

Mixed findings for SES effects on adolescent substance use are partly due to the measurement issues outlined above. Additionally, the effect of SES can be substance-specific. Although alcohol and marijuana use in adolescence is positively linked to family income, (Goodman and Huang, 2002; Moore et al., 2017), the opposite trend is observed for cigarettes (Poonawalla et al., 2014). Different SES measures can also have distinct associations with the same substance. While family income is positively linked to alcohol and marijuana use, parental education has negative associations with those substances (Leventhal et al., 2015), suggesting unique effects for different family SES dimensions. These associations can also change across development as some substance use becomes normative in young adulthood. Among young adults, different

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family SES indicators more consistently show positive associations with alcohol (Leventhal et al., 2015) and marijuana use (Humensky, 2010), and negative associations with tobacco use (Patrick et al., 2012).

Adolescent-reported subjective SES (e.g., social status) is usually more consistent with parent-reported SES (Goodman et al., 2001) than adolescent-reported objective SES (e.g., parental education and income), which may be unreliable until late adolescence (Looker, 1989). This could be because subjective SES measures are more age-appropriate for adolescents. It is also possible that subjective measures better capture youths' perceptions of family SES, which can be a stronger determinant of their health outcomes than objective measures (Goodman et al., 2001; Goodman and Huang, 2002). Subjective measures also tend to elicit higher adolescent response rates than objective measures (Svedberg et al., 2016). Thus, subjective SES measures may be more appropriate for youth and assess unique dimensions of SES not captured by objective measures like parental income or education.

This study focuses on one such subjective measure, used previously in the National Survey of American Life Adolescent supplement (NSAL-A; Jackson et al., 2016). This measure assesses adolescent perceptions of family financial security (PFS) by asking whether their family has enough money to meet their needs. Although this measure has been used to examine SES with geriatric (Wolinsky et al., 2005), adult (Caldwell et al., 2011), and college student samples (Eisenberg et al., 2007), it has yet to be rigorously tested with adolescents.

Our goal in this paper was to compare the utility of PFS with other adolescent reported family SES measures that are more traditionally used in developmental research (e.g., parental education) using a large and diverse sample that was followed longitudinally from middle school to early adulthood. Our specific aims were to examine: (a) test–retest reliability of the PFS measure; (b) convergent validity of PFS with adolescent reports of parental education and parents' reports of their education and family income; and (c) predictive associations of adolescent-reported PFS, as compared to adolescent-reported parental education, with three commonly used substances (i.e., alcohol, tobacco, and marijuana) during adolescence and young adulthood.

2. Methods

2.1. Recruitment and participants

Data were drawn from 593 parent–child dyads recruited from three urban middle schools in the Pacific Northwest of the United States during 2005–2006 for an efficacy trial of a family-based intervention. Participants represented diverse race-ethnic groups (36% European American/White; 19% biracial/mixed identity; 18% Hispanic/Latino; 15% African American/Black; 11% Asian American, American Indian-Native American, or Pacific islander). Nearly half of the participants self-identified as female (51% male).

In total, seven assessments were conducted. The first four were administered in consecutive years, beginning when participating children were in sixth grade and ending in ninth grade. After a four-year interval, three more annual assessments were conducted during young adulthood. Among intervention group families ($n = 386$; 65%), parent data was collected from one parent (94.4% were mothers or mother figures) for the first three annual assessments (sixth–eighth grade). The total sample included nine sets of siblings. We tested our findings with and without sibling data and found no changes in our results. Among key variables at T1, no group differences were observed between intervention and control groups, and attrition rates did not differ between intervention and control groups. For more details, see Stormshak et al. (2011).

Our study used data from five assessments: The first four annual assessments, sixth through ninth grade, hereafter labeled as 'T1' ($M_{\text{age}} = 11.87 \pm 0.39$; range = 10.25–13 years), 'T2' ($M_{\text{age}} = 13.12 \pm 0.38$; range = 11.67–14.17 years), 'T3' ($M_{\text{age}} = 14.11 \pm 0.40$; range = 13.17–15.25 years), 'T4' ($M_{\text{age}} = 15.07 \pm 0.42$; range = 13.42–16.33

years); and the second of three assessments during young adulthood, hereafter referred to as 'T5' ($M_{\text{age}} = 21.5 \pm 0.70$; range = 20.0–23.42 years). We used this young adulthood assessment to have a longer-term follow-up and greater variability in substance use as most participants were of legal age for alcohol, marijuana, and tobacco use. We also used T1–T3 parent-reported SES from the intervention group families ($n = 386$; 65%). Sample demographics are reported in Table 1.

2.2. Measures

2.2.1. Perceived family financial security (adolescent reports)

Adolescent perception of family financial security (PFS) was assessed using the question, "How much money does your family have?" Response categories included: *not enough to get by* (1), *just enough to get by* (2), *we only have to worry about money for fun or extras* (3), and *we never have to worry about money* (4). PFS assessments from T1–T4 were used to evaluate the test–retest reliability of the measure. T1–T3 PFS assessments were used for tests of convergent validity with parent-reported SES measures. T3 PFS assessment was used to predict T4 substance use outcomes, and T4 PFS assessment was used to predict T5 substance use outcomes (Table 1).

2.2.2. Parental education (adolescent reports; T1–T4)

Adolescents reported their mother and father's highest level of education completed. Responses were coded into the following categories: *completed grade school or less* (1), *some high school* (2), *completed high school* (3), *some college* (4), *completed college* (5), and *graduate or professional school after college* (6). For our analyses, we used the highest level of education completed by either parent. T1–T3 assessments were used to test convergent validity with PFS and parent-reported SES measures. T3 assessment was used to predict T4 substance use, and T4 assessment was used to predict T5 substance use.

2.2.3. Parental education (parent reports; T1–T3)

Intervention group parents reported on their highest education level at T1–T3. Education was reported on a scale from 1 (*no formal schooling*) to 9 (*graduate/professional training/degree*). T1–T3 assessments were used to test convergent validity of PFS.

Table 1
Descriptive Frequencies and Percentages by Data Timepoint (T1–T5) for Parent-Child Dyads ($N = 593$) in the Pacific Northwest of the United States.

Variables	T1	T2	T3	T4	T5
<i>M(SD)</i> PFS*	2.88 (0.82)	2.86 (0.76)	2.84 (0.73)	2.66 (0.73)	–
<i>M(SD)</i> Parental Education*	4.25 (1.43)	4.17 (1.37)	4.16 (1.41)	4.11 (1.37)	–
<i>M(SD)</i> Parental Education**	5.98 (2.12)	6.14 (2.29)	5.55 (2.48)	–	–
<i>M(SD)</i> Family Income**	7.99 (3.65)	7.96 (3.60)	5.98 (3.63)	–	–
<i>M(SD)</i> Age in years	11.87 (0.39)	13.12 (0.38)	14.11 (0.40)	15.07 (0.42)	21.50 (0.70)
% Total (n) Race/Ethnicity					
European	36.09 (214)	32.88 (195)	32.04 (190)	30.69 (182)	22.60 (134)
American/White	19.22 (114)	17.03 (101)	17.03 (101)	17.03 (101)	13.49 (80)
Hispanic/Latino	18.04 (107)	16.02 (95)	14.67 (87)	14.17 (84)	11.64 (69)
Biracial/mixed identity	15.01 (89)	12.65 (75)	12.65 (75)	11.64 (69)	10.46 (62)
African American/Black	11.47 (68)	9.95 (59)	9.61 (57)	9.61 (57)	7.25 (43)
Other					

Note. *Adolescent Reports. Variables collected at T1–T4. **Parent reports, collected at T1–T3 from intervention group participants only. *M* = mean; *SD* = standard deviation.

2.2.4. Family income (parent reports; T1–T3)

Intervention group parents also reported on their gross annual household income before taxes, including any other financial support received, using a 13-point scale from 1 (*less than \$4,999*) to 13 (*\$90,000 or more*). T1–T3 assessments were used to test convergent validity of PFS.

2.2.5. Alcohol use frequency (T4)

Adolescents responded to the question, “In the last month, how many drinks of alcohol have you had?” Drinks were defined as one glass of beer or wine or one shot of hard liquor. Response options ranged from 0 (*none*) to 13 (*41 drinks or more*). Given the skewed distribution, the responses were recoded as 0 = *no drinks*, 1 = *1–2 drinks*, 2 = *3–4 drinks*, and 3 = *5 drinks or more* ($M = 0.51$; $SD = 0.85$).

2.2.6. Alcohol use frequency (T5)

Young adults responded to three separate questions about beer, hard liquor, and wine/wine coolers/malt liquor: (a) “How often did you drink beer in the last 3 months?”; (b) “How often did you drink hard liquor in the last 3 months?”; and (c) “How often did you drink wine/wine coolers/malt liquor in the last 3 months?” Response options for each question included: *never in the past 3 months* (1), *once or twice in the past 3 months* (2), *once a month* (3), *once every 2–3 week* (4), *once a week* (5), *2–3 times a week* (6), *4–6 times a week* (7), *once a day* (8), and *2–3 times a day or more* (9). Responses were averaged to create a single frequency score. Those who had never used alcohol in their lifetime skipped those questions and were coded as 0 = *never used alcohol* ($M = 2.62$; $SD = 1.53$; range = 0–9).

2.2.7. Marijuana use (T4)

Adolescents responded to the question, “In the last month, how many times did you smoke marijuana?” Response options ranged from 0 (*none*) to 13 (*41 or more*). Given the number of non-users (71.16%), we recoded this variable as 0 = *no use in the last month*, 1 = *used at least once in the last month*.

2.2.8. Marijuana use frequency (T5)

Young adults responded to the question, “How often have you used marijuana in the last 3 months?” Response options included: *never in the past 3 months* (1), *once or twice in the past 3 months* (2), *once a month* (3), *once every 2–3 weeks* (4), *once a week* (5), *2–3 times a week* (6), *once a day* (7), and *2–3 times a day or more* (8). Those who had never used marijuana in their lifetime skipped this question and were coded as (0) *never used marijuana*. Given the skewness, responses were recoded as: 0 = *Never used in lifetime*, 1 = *Never in the past 3 months*, 2 = *Once or twice in past 3 months*, 3 = *Once or twice a month*, 4 = *1–3 times a week*, 5 = *Once a day*, 6 = *2–3 times a day or more* ($M = 2.19$; $SD = 2.09$; range = 0–6).

2.2.9. Tobacco use (T4)

Adolescents responded to the question, “In the last month, how many cigarettes have you smoked?” Response options ranged from 0 (*none*) to 16 (*5 or more packs*). Given the number of non-users (75.6%), we recoded responses as 0 = *no use in the last month* or 1 = *used at least once in the last month*.

2.2.10. Tobacco use frequency (T5)

Young adults responded to the question, “How much did you smoke in the last three months?” Response options included: *0 cigarettes* (1), *<1 cigarette per week* (2), *1–5 cigarettes per week* (3), *More than 5 cigarettes, but less than a pack per week* (4), *1 pack of cigarettes per week* (5), *If more than one pack per week, how many?* (6). Those who had never used tobacco in their lifetime skipped this question and were coded as (0) *never used cigarettes*. Given the skewness, we combined the two items and recoded them: 0 = *never used cigarettes in lifetime*, 1 = *0 cigarettes in past 3 months*, 2 = *<1 cigarette per week in past 3 months*, 3 = *1 cigarette to less than a pack per week in past 3 months*, 4 = *1 pack per week*, 5 = *more than a*

Table 2
Correlations Between Study Variables for Parent-Child Dyads (N = 593) in the Pacific Northwest of the United States.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. PFS T1	1.00																			
2. PFS T2	0.42	1.00																		
3. PFS T3	0.42	0.66	1.00																	
4. PFS T4	0.42	0.55	0.59	1.00																
5. Parent Ed T1	0.28	0.23	0.21	0.28	1.00															
6. Parent Ed T2	0.30	0.30	0.23	0.30	0.73	1.00														
7. Parent Ed T3	0.26	0.24	0.26	0.29	0.69	0.80	1.00													
8. Parent Ed T4	0.31	0.27	0.26	0.33	0.69	0.81	0.86	1.00												
9. Parent Ed T1*	0.45	0.30	0.20	0.41	0.68	0.79	0.77	0.85	1.00											
10. Parent Ed T2*	0.43	0.29	0.11	0.39	0.66	0.79	0.77	0.83	0.96	1.00										
11. Parent Ed T3*	0.61	0.28	0.05	0.56	0.73	0.85	0.78	0.88	0.98	0.98	1.00									
12. Income T1*	0.38	0.43	0.38	0.46	0.40	0.42	0.53	0.57	0.50	0.61	0.60	1.00								
13. Income T2*	0.40	0.35	0.27	0.49	0.41	0.50	0.56	0.58	0.58	0.62	0.67	0.89	1.00							
14. Income T3*	0.48	0.51	0.36	0.67	0.58	0.67	0.69	0.76	0.60	0.64	0.63	0.85	0.87	1.00						
15. Alc Freq T4	0.01	0.02	-0.01	0.00	-0.07	0.00	-0.03	-0.01	0.09	0.16	0.20	-0.02	0.12	0.00	1.00					
16. Alc Freq T5	0.24	0.25	0.21	0.12	0.26	0.31	0.30	0.24	0.40	0.43	0.55	0.49	0.54	0.58	0.07	1.00				
17. Tob Use T4	-0.04	-0.13	-0.08	-0.03	-0.04	-0.11	-0.08	-0.07	-0.11	-0.15	-0.14	-0.15	-0.04	-0.22	0.46	-0.01	1.00			
18. Tob Freq T5	0.01	0.04	-0.03	-0.08	0.08	0.05	0.09	0.04	0.05	0.15	0.12	0.09	0.04	0.04	0.13	0.20	0.09	1.00		
19. Mar Use T4	0.06	-0.04	-0.08	-0.08	-0.02	-0.06	-0.07	-0.04	0.07	0.09	0.16	-0.10	0.00	0.01	0.52	0.08	0.48	0.18	1.00	
20. Mar Freq T5	0.18	0.14	0.10	-0.02	0.05	0.05	0.05	0.03	0.09	0.13	0.30	0.01	0.06	0.09	0.16	0.33	0.17	0.38	0.23	1.00
n	536	502	496	491	493	457	460	462	178	118	55	174	117	53	491	387	492	383	492	388
Missing data ratio	0.10	0.15	0.16	0.17	0.17	0.23	0.22	0.22	0.54	0.69	0.86	0.55	0.70	0.86	0.17	0.35	0.17	0.35	0.17	0.35
Mean	2.88	2.86	2.84	2.66	4.25	4.17	4.16	4.11	5.98	6.14	5.55	7.99	7.96	7.79	2.62	2.62	0.09	0.72	0.14	2.19
Std. Deviation	0.82	0.76	0.73	0.73	1.43	1.37	1.41	1.37	2.12	2.29	2.48	3.65	3.60	3.63	0.80	1.53	0.29	1.22	0.35	2.09

Note. Significant values $p < 0.05$ are in bold. T1 - T5 = Time 1 - Time 5. PFS = perceived financial security; Ed = education; Alc = alcohol; Tob = tobacco; Mar = marijuana; Freq = frequency; * = parent reports, all else are adolescent reports.

pack per week ($M = 0.72$; $SD = 1.22$; range = 0–4).

2.2.11. Covariates

Adolescents reported sex, race-ethnicity, and age at T1, which were included as controls, with males and European American/White as the reference groups. Intervention group assignment was included to account for any intervention effects. Age was calculated using reported birthdays and the assessment date. Because most participants were 12 years old, we recoded age into three categories: 1 = less than or equal to 11 years (15.50%), 2 = 12 years (80.10%), 3 = 13 years (4.22%).

2.3. Missing data

Substantial data were missing for T1–T3 parent-reported family income (54.92%–86.27%) and parental education (53.89%–85.75%; Table 2). This amount of missingness is unsurprising and comparable to prior studies using parent SES reports (Currie et al., 1997; Wardle et al., 2002). Adolescent and young adult missing data ranged from 10% to 35% (Table 2). For general linear models, we treated missingness using full information maximum likelihood (FIML), using all available information from observed data in the analyses. Compared with mean-imputation, list-wise, or pair-wise models, FIML provides more statistically reliable standard errors (Brown et al., 2008). For logistic and ordinal regression models, we handled missing data using multivariate imputation by chained equations (MICE; $m = 20$). FIML and MICE assume that data are missing at random. The present data met this assumption.

2.4. Plan of analysis

The test–retest reliability of PFS was estimated using the intraclass correlation coefficients (ICC) using T1–T4 assessments. To evaluate the convergent validity of PFS, we used exploratory factor analysis (EFA) with oblimin rotation. To examine prospective associations of adolescent-reported PFS and parental education with substance use, we used separate models for T4 and T5 alcohol, marijuana, and tobacco use measures. We used logistic regression to predict binary outcomes, T4 tobacco use and marijuana use. For ordinal outcomes, i.e., T4 alcohol use, T5 marijuana use, and T5 tobacco use, we tested whether the proportional odds assumption was met. This assumption was met in the case of T4 alcohol use (Brant Test [$df = 18$] = 15.43, $p = .63$) and T5 marijuana use (Brant Test [$df = 60$] = -54.80, $p = 1.00$). Both these outcomes were modeled using ordinal regression. The proportional odds assumption was not met for T5 tobacco use (Brant Test [$df = 60$] = 148.40, $p < 0.001$), hence we used ordinary least squares (OLS) regression for this outcome, with the Huber-White sandwich estimator to account for potential violations of normality (Huber, 1967). OLS with robust estimation was also used in case of T5 alcohol use. In testing prospective associations with substance use outcomes, we first evaluated the effects of adolescent-reported PFS and parental education separately, with the covariates, then included them together in the same model. All analyses were conducted in R 3.6.2 (R Core Team, 2019).

3. Results

3.1. Test-Retest reliability of PFS

The test–retest reliability of adolescent PFS met the recommended benchmarks ($ICC [2, k] = 0.79 [0.77–0.82]$, $p < .01$), indicating that there was significant stability in PFS assessments across the four study time points.

3.2. Convergent validity

At T1, PFS had moderate correlations with adolescent-reported parental education ($r = 0.28$), parent-reported education ($r = 0.45$)

and family income ($r = 0.38$). The correlations were comparable in magnitude at T2 and T3 except for parent-reported education, which dropped at T2 ($r = 0.29$) and T3 ($r = 0.05$) (Table 2). EFA for T1–T3 SES measures suggested that PFS had a significant amount of common variance with parental education (adolescent- and parent-report) and family income (parent-report), with most factor loadings greater than 0.30 (Table 3). At T1, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy for PFS was 0.70 (above the standard of 0.60) and Bartlett's test of sphericity was significant, ($\chi^2(6) = 710.41$, $p < .01$). T2 and T3 PFS demonstrated similar results: KMO (T2) = 0.68 and KMO (T3) = 0.67; and Bartlett's test of sphericity was significant at T2 ($\chi^2(6) = 185.87$, $p < .01$) and T3 ($\chi^2(6) = 1095.99$, $p < .01$). There was also a significant amount of unique variance in PFS across the waves that was not accounted for by the common latent factor.

3.3. Prospective associations with substance use

T3 PFS and parental education did not significantly predict T4 alcohol use frequency, whether tested separately (PFS: $B = -0.02$, $SE = 0.16$, $p = .90$; parental education: $B = -0.12$, $SE = 0.09$, $p = .20$) or together (see Table 4 for model estimates testing their effects simultaneously). When testing individual effects predicting T5 alcohol use frequency, T4 PFS did not have a significant effect ($B = 0.17$, $SE = 0.11$, $p = .11$), while T4 parental education was significantly related ($B = 0.20$, $SE = 0.06$, $p < .01$). Similar findings were produced with PFS and parental education simultaneously in the model with covariates (Table 4).

T3 PFS and parental education did not significantly predict T4 marijuana use, whether tested individually (PFS: $B = -0.26$, $SE = 0.20$, $p = .19$; parental education: $B = -0.18$, $SE = 0.11$, $p = .11$) or together (Table 5). T4 PFS and parental education did not significantly predict T5 marijuana use frequency in models testing individual effects (PFS: $B = -0.05$, $SE = 0.15$, $p = .73$; parental education: $B = 0.03$, $SE = 0.08$, $p = .73$). Similar results were found for PFS and parental education in the model with covariates (Table 5).

T3 PFS and parental education did not significantly predict T4 tobacco use, whether tested individually (PFS: $B = -0.48$, $SE = 0.25$, $p = .05$; parental education: $B = -0.26$, $SE = 0.15$, $p = .09$) or together (Table 6). However, T4 PFS held a significant effect on T5 tobacco use frequency when tested individually ($B = -0.22$, $SE = 0.20$, $p = .02$), whereas parental education did not ($B = -0.05$, $SE = 0.06$, $p = .38$). Similar findings were produced with PFS and parental education in the same model with covariates (Table 6).

4. Discussion

Despite the critical role of family SES as a predictor of adolescent health disparities, research linking SES and substance use often relies on adolescent reports of parental education and family income, which lack

Table 3
Factor Loadings for Exploratory Factor Analysis with Varimax Rotation of SES Measures T1-T3 for Parent-Child Dyads in the Pacific Northwest of the United States (Intervention group participants only; $N = 386$).

	T1	T2	T3
PFS ^a	0.49	0.32	0.25
Parental education ^a	0.73	0.82	0.93
Family income ^b	0.55	0.65	0.75
Parental education ^b	0.93	0.96	0.83
Eigenvalues	1.94	2.11	2.18
% of variance	48.50	52.80	54.50

Note. Factor loadings greater than 0.30 appear in boldface. ^a = adolescent reports; ^b = parent reports (available for intervention group participants at T1-T3 only). PFS = perceived financial security. Only measures that were adolescent reports (i.e., PFS and parental education^a) were used in the models predicting substance use outcomes.

Table 4
Regression Models Predicting Alcohol Use Frequency During Adolescence (T4) and Young Adulthood (T5) Using Adolescent-Reported PFS and Parental Education Data (N = 593) from the Pacific Northwest of the United States.

	Alcohol use frequency (T4)			Alcohol use frequency (T5)		
	B	SE	p	B	SE	p
PFS*	0.02	0.17	0.92	0.08	0.11	0.46
Parental education*	-0.09	0.10	0.36	0.19	0.07	0.01
Alcohol use frequency (T4)	-	-	-	0.12	0.09	0.21
Sex (<i>female</i> = 1)	0.10	0.22	0.65	-0.34	0.15	0.02
Age	0.20	0.28	0.49	0.14	0.16	0.37
Race/Ethnicity						
Hispanic/Latino	-0.38	0.38	0.32	-0.60	0.23	0.01
Biracial/mixed identity	-0.37	0.32	0.24	-0.35	0.22	0.10
African American/Black	-0.48	0.37	0.19	-0.59	0.23	0.01
Other	-0.22	0.39	0.58	-0.68	0.24	0.01
Intervention group assignment	0.01	0.24	0.95	0.30	0.16	0.06
0 1	3.24	3.51	0.36	-	-	-
1 2	3.89	3.50	0.27	-	-	-
2 3	4.91	3.51	0.16	-	-	-

Note. PFS = perceived family financial security. * T3 assessment used for predicting alcohol use frequency at T4, and T4 assessment used for predicting alcohol use frequency at T5. For Race/Ethnicity, levels were dummy coded, and European American/White was assigned as the reference group. Findings significant at $p < 0.05$ are highlighted in bold.

Table 5
Regression Models Predicting Adolescent Marijuana Use (T4) and Young Adult Marijuana Use Frequency (T5) Using Adolescent-Reported PFS and Parental Education Data (N = 593) from the Pacific Northwest of the United States.

	Marijuana use T4			Marijuana use frequency T5		
	B	SE	p	B	SE	p
PFS*	-0.40	0.26	0.12	-0.05	0.15	0.73
Parental education*	-0.21	0.16	0.21	0.03	0.08	0.73
Marijuana use (T4)	-	-	-	0.84	0.23	0.00
Sex (<i>female</i> = 1)	-0.34	0.36	0.34	-0.39	0.19	0.04
Age	-0.55	0.39	0.16	-0.16	0.20	0.44
Race/Ethnicity						
Hispanic/Latino	-0.17	0.58	0.77	-0.15	0.31	0.63
Biracial/mixed identity	0.23	0.45	0.62	0.15	0.25	0.56
African American/Black	-1.00	0.73	0.17	-0.30	0.30	0.31
Other	-0.59	0.66	0.37	-0.40	0.32	0.22
Intervention group assignment	-0.25	0.35	0.47	0.07	0.18	0.68
0 1	-	-	-	-2.89	2.46	0.24
1 2	-	-	-	-1.98	2.45	0.42
2 3	-	-	-	-1.45	2.45	0.56
3 4	-	-	-	-1.18	2.46	0.63
4 5	-	-	-	-0.64	2.47	0.79
5 6	-	-	-	-0.16	2.48	0.95

Note. PFS = perceived family financial security. * T3 assessment used for predicting alcohol use frequency at T4, and T4 assessment used for predicting alcohol use frequency at T5. For Race/Ethnicity, levels were dummy coded, and European American/White was assigned as the reference group. Findings significant at $p < 0.05$ are highlighted in bold.

accuracy or reliability. Developmentally appropriate and psychometrically sound SES measures are needed to better understand relations between adolescent SES and substance use. Our findings provide initial evidence for the reliability and validity of a family SES measure (i.e., PFS) that is age-appropriate for adolescents and has predictive associations with tobacco use frequency, using a large and diverse sample followed from middle school into early adulthood.

PFS had high test-retest reliability and strong convergent validity compared to common SES measures, including adolescent-reported parental education and parental self-reported education and family income. PFS had significant unique variance, suggesting that it measures a

Table 6
Regression Models Predicting Tobacco Use During Adolescence (T4) and Tobacco Use Frequency in Young Adulthood (T5) Using Adolescent-Reported PFS and Parental Education Data (N = 593) from the Pacific Northwest of the United States.

	Tobacco use (T4)			Tobacco use frequency (T5)		
	B	SE	p	B	SE	p
PFS*	-0.40	0.26	0.12	-0.22	0.10	0.02
Parental education*	-0.21	0.16	0.21	-0.01	0.06	0.81
Tobacco use (T4)	-	-	-	0.35	0.23	0.14
Sex (<i>female</i> = 1)	-0.34	0.36	0.34	-0.09	0.12	0.45
Age	-0.55	0.39	0.16	0.04	0.14	0.77
Race/Ethnicity						
Hispanic/Latino	-0.17	0.58	0.77	-0.64	0.22	0.00
Biracial/mixed identity	0.23	0.45	0.62	0.23	0.20	0.24
African American/Black	-1.00	0.73	0.17	-0.46	0.18	0.01
Other	-0.59	0.66	0.37	-0.32	0.22	0.15
Intervention group assignment	-0.25	0.35	0.47	-0.12	0.13	0.37

Note. PFS = perceived family financial security. * T3 assessment used for predicting alcohol use frequency at T4, and T4 assessment used for predicting alcohol use frequency at T5. For Race/Ethnicity, levels were dummy coded, and the European American/White level was assigned as the reference group. Findings significant at $p < 0.05$ are highlighted in bold.

distinct dimension of family SES that may not be shared by other SES indices like parental education and family income. Parent-reported education had higher stability across waves than adolescent-reported parental education. Consistent with our predictions, this suggests that adolescent-reported parental education may be less reliable than parents' self-report. In comparison, PFS scores had a narrower range of correlations across waves than parental education reports, indicating that PFS may more reliably gauge adolescent-reported family SES.

The uniqueness of PFS was also evident in its associations with substance use compared to parental education. PFS was related to young adult tobacco use frequency, suggesting that adolescents from families without enough money to get by were more likely to report more cigarette use in early adulthood than their more financially secure peers. As a subjective measure, PFS may be a better proxy of financial burden or perceived stress from low financial security than parental education (Adler, 2006). This is consistent with research documenting that lower SES youth tend to be more likely to smoke cigarettes (Hanson and Chen, 2007; Poonawalla et al., 2014), possibly as a coping strategy (Hiscock et al., 2010).

PFS and parental education were not significantly associated with adolescent tobacco use. This may be because our sample had low tobacco use rates, though prior research has found non-significant associations between SES and cigarette use when accounting for covariates (Patrick et al., 2012). PFS had a trend-level negative association with tobacco use during adolescence ($p = .05$), suggesting that adolescents with low family financial security might use cigarettes more frequently. These findings warrant future replication.

Neither PFS nor parental education predicted adolescent or young adult marijuana use, though positive associations between marijuana use and parental education have been previously reported (Leventhal et al., 2015; Moore et al., 2017). Our null findings may be related to a lack of power given our sample's low marijuana use rates.

Regarding alcohol use, parental education was significantly and positively associated with young adult alcohol use frequency (Leventhal et al., 2015; Patrick et al., 2012). Adolescents with more educated parents reported more frequent alcohol use as young adults than those with less-educated parents. Young adults from more educated families may have more resources for buying alcohol and drinking opportunities, such as college contexts, where frequent drinking is normalized (Schulenberg and Maggs, 2002).

5. Limitations

The following limitations should be noted. First, we may have been unable to detect significant associations of PFS with substance use because of our sample's low substance use rates. Future studies could avoid this by examining substance use intentions and risk propensities among adolescents. Second, our longitudinal findings for SES and substance use are based on adolescent self-reports and are susceptible to recall bias and shared method variance. Also, notable variability among PFS and parent-reported SES correlations may be attributed to large amounts of missing parent data.

Overall, our findings support the psychometric utility of PFS as an adolescent self-report measure of family SES with evidence for its test-retest reliability, convergent validity, and predictive association with tobacco use. PFS had unique variance independent from other SES indicators and distinct predictive associations with substance use outcomes compared to adolescent-reported parental education. Future studies should evaluate PFS with other SES measures (subjective and objective) to clarify its longitudinal relations with substance use and other adolescent health outcomes, including mental health, while also examining its mechanisms of influence, and potential moderators like sex and race-ethnicity.

6. Author Note

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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