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A Person-Centered Approach to Individualizing a School-Based Universal Preventive Intervention

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Background/Objectives: This manuscript focuses on how individualized components may be embedded within a universal preventive intervention (TimeWise: Taking Charge of Leisure Time) to make program delivery more effective. Leisure related variables (motivation, boredom/interest and peer and parental influence) were used to suggest ways to individualize the program. **Methods:** Latent Class Analysis was used to develop individualized risk and strength profiles of adolescents ($N = 617$). Comparisons were made between a treatment and control group. **Results:** Four classes were identified: undifferentiated high, intrinsic motivation, extrinsic motivation/amotivation, undifferentiated low. These classes were related to substance use. Membership in the intrinsic class was associated with intervention group while the extrinsic class was related to the control group. **Conclusions and Scientific Significance:** Results were useful in suggesting ways to tailor a universal prevention program.

Keywords Adolescent motivation, latent class analysis, leisure, ontogenetic approach, substance use

INTRODUCTION

This manuscript focuses on how individualized components may be embedded within a universal preventive intervention to make program delivery more effective. A tailored approach that takes into consideration the unique risk and strength profiles of adolescents who receive a school-based intervention is proffered. We suggest a strategy of identifying adolescents'

self-regulation skills and risk profiles prior to beginning the intervention, and describe how these profiles can be used to tailor a universal intervention with an ontogenetic perspective.

TimeWise: Taking Charge of Leisure Time (1) is a school-based, risk reduction and health promotion intervention that focuses on helping youth learn to use their leisure time in healthy ways. TimeWise (TW) targets leisure because it is a time of both risk and opportunity for healthy development (e.g., 2). In particular, TW focuses on helping youth learn that boredom, disinterest, and inability to plan for their preferred activities increases their risk of engaging in unhealthy or antisocial behaviors (e.g., substance use, physical inactivity, and vandalism). Although TW has had some success as a universal prevention intervention (see 3), effect sizes are fairly low and we hypothesize that better results would be realized from taking an ontogenetic approach.

Theoretical Considerations

One reason the leisure time context is risky is because some adolescents *experience* leisure negatively. Boredom, for example, may occur during leisure and is considered a risk factor; adolescents who reported often being bored or stressed are more likely to smoke, drink, get drunk, and use illegal drugs (4). TW directly addresses boredom and helps youth identify their interests, learn how to overcome a boring situation, and learn how to overcome constraints to engaging in preferred activities. Helping youth develop interests is important to positive functioning and healthy development (5).

There are multiple reasons for experiencing boredom in leisure that implicate a need to help youth understand their own motivations for engaging in leisure activities. For example, youth who "have to do something" or do something because

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there is “nothing else to do” often experience boredom (6). Thus, TW lessons were based on self-determination theory (SDT) (7), a theory of motivation types represented on a continuum of how externally or internally motivated one is. At one end is *extrinsic motivation*, which is characterized by doing something solely to gain some type of external reward (e.g., doing what one is supposed to do). *Introjected motivation* is next and represents action out of pride, guilt, or obligation. *Identified motivation* suggests that the activity is goal driven; someone does an activity for a purpose or to achieve something that is valued internally. Action that stems from *intrinsic motivation* is done for the pleasure it gives, which could be due to feelings of competence, relatedness, or autonomy. Another type of motivation is *amotivation*, which represents action that stems from having nothing else to do, perceiving no benefit from the activity, or not feeling competent in the activity.

One factor that influences adolescent motivation and may be related to boredom is degree and type of parental involvement. Adolescents who perceive that parents exert too much control report diminished autonomy and self-regulation (8, 9). Perceived over control is also associated with boredom (6, 10, 11). Conversely, the literature is clear that parental knowledge of where adolescents go and who they are within their free time is a protective factor when it comes to substance use (12, 13).

Peer influence is another factor related to the motivation and self-regulation of adolescents and is considered an important risk and protective factor (14). Literature widely suggests that peer influence is a major cause of substance use initiation and maintenance (e.g., 15, 16) as is boredom (4). On the other hand, peers can serve to reinforce abstinent behavior.

Identifying Preliminary Person-Centered Profiles

Given these considerations, an ontogenetic approach to delivering TW considers the dynamic play between within-individual characteristics and the environment (e.g., 17) to establish certain individuals or groups of individuals for whom more tailored approaches may be more effective. In our case, we use combinations of the variables interest/boredom, self-determination, and parental control to construct different profiles of individuals. These distinct constructs have some conceptual overlap and interplay, and are central to adolescent leisure experience, which is why they were chosen for this analysis. Although TW was based on the premise that change and growth require self-regulation on the part of the individual, and many activities encourage students to tailor the material to their own needs, an ontogenetic approach would require even more attention to this process.

Thus, in this article we use a person-centered approach that provides insight on how to better tailor TW to meet individual needs. First, we explore person-specific motivation profiles. Second, we address whether the profiles differ by gender. Third, we assess the degree to which TW influenced individuals' motivational profiles by comparing pre- and post-test data. Fourth,

we address whether the profiles differ for those with no substance use vs. any substance use.

METHOD

Sample

Data for this study were drawn from a pre-test (Wave 1) and post-test (Wave 2) assessment of a longitudinal study designed to test the effects of TW among students in nine rural schools in Pennsylvania. Of the 659 seventh grade students at Wave 1 who received parental permission and agreed to participate in the study (63% recruitment rate), 49.7% were female, 95% were Caucasian; 370 were in the control group, and 289 were in the TimeWise intervention group. The sample size for the Wave 2 was 617.

Measures

The following variables, all focused on leisure, were used to develop individual profiles: amotivation, extrinsic motivation, identified motivation, intrinsic motivation, interest/boredom, peer influence, and perceived parental control. These have been more fully described elsewhere (3). Cigarette use and alcohol use were measured with two separate items, using a frequency from “never” to “more than once a day.” All predictor and outcome variables were dichotomized at the median (due to skewness) to form a variable that represented high-risk or low-risk (e.g., high amotivation = high risk). The substance use outcomes were categorized into ever used vs. never used due to skewness issues: 81% of the sample had never used cigarettes, and 68% had never drank.

Statistical Analyses

Latent class analysis (LCA) was used to identify motivational profiles. LCA estimates the proportion of individuals expected to be in each latent class (i.e., membership probabilities for each subgroup of people based on motivational profile) and a set of measurement parameters that link the items to the latent classes (item response probabilities). We used SAS PROC LCA (18, 19) to conduct all analyses in SAS version 9.1 for Windows. The estimation procedure allows for missing values on the items assuming that the values are missing at random (20).

First, the number of latent classes based on a balance of parsimony, interpretability, and fit were selected using the log-likelihood statistic (G^2), the Akaike Information Criterion (AIC) (21), and the Bayesian Information Criterion (BIC) (22) to assess model fit (23). Next, the LCA model was extended to include gender as a grouping variable to investigate if our interpretation of the latent classes should differ for male and female students. TW was included in the model to test for intervention effects and the parameters relating the intervention to class membership were estimated. The significance of this model was tested by taking the difference between the G^2 for a model including the intervention as a covariate and a model excluding the

intervention as a covariate. The G^2 difference is distributed as chi-square with degrees of freedom (df) equal to the difference in df between the two models.

Finally, we included the substance use variables as grouping variables to determine whether the class membership probabilities differed for those with no substance use vs. any substance use. Note that these analyses do not speak to the probability of engaging in a particular substance use behavior given membership in a particular class. Rather, the analyses show the probability of belonging to a particular motivational class based on engagement in a particular substance use behavior.

RESULTS

Latent Class Structure

Models with two to five latent classes were compared using the criteria described above for the first wave of data (pre-intervention). The G^2 , df , BIC, and AIC for each model (see Table 1) were assessed and the four class model was selected as it was the most clearly interpretable and parsimonious.

Table 2 shows class membership and item response probabilities. Class 1 was labeled *Undifferentiated High* (UH) because individuals in this class had a high probability of reporting high levels on all items, although only 9% of students fell into this class. Class 2 was labeled *Intrinsic Motivation* (IM); individuals in this class had a high probability of being interested; reporting high intrinsic motivation; and being low in amotivation, extrinsic motivation, peer influence, and parental control. Approximately 43% of youth fell into this class. Another 40% fell into Class 3,

labeled *Extrinsic Motivation/Amotivation* (EX/AM) because individuals in this class had a high probability of reporting being bored; high extrinsic motivation, amotivation, peer influence, and parental control; and low intrinsic motivation. Class 4 was labeled *Undifferentiated Low* (UL) because individuals in this class had a high probability of being low on all items (about 8% of students). We replicated these findings for the second wave of data (post-intervention). We also checked for model identification by using several sets of random starting values and we found that the model was identified.

Measurement Invariance by Gender

Measurement invariance across gender for the Wave 1 data was tested by incorporating gender as a grouping variable and fitting two models: a model that constrained measurement to be equal across groups and a model that allowed the measurement of the four classes to vary across groups. The df , G^2 , BIC, and AIC are presented in Table 1. The significance test ($G^2_{diff}(28) = 26.35$, $p = .55$) indicated that the four classes were the same for both genders, and therefore, the class membership probabilities could be compared across gender. Gender differences, however, were marginal.

Intervention

Using the Wave 2 data, we tested whether TW had a significant effect on latent class membership using a multinomial logistic regression. The TW intervention was used as a predictor of the latent classes; therefore, it was not necessary to assign participants to latent classes. The EX/AM class was used as the reference or baseline group. TW was a significant predictor of class membership probability ($G^2_{diff}(3) = 11.7$, $p < .01$). Those who received the TW intervention were 1.35 times more likely to belong to the UH class than the EX/AM class, 1.71 times more likely to belong to the UL class than the EX/AM class, and 2.32 times more likely to belong to the IM class than the EX/AM class. These odds ratios were then used to compute the class membership probabilities by intervention condition, which are shown in Fig. 1. The control group had a higher probability of being classified into the EX/AM class, and the TW group had a higher probability of being classified into the IM class.

Substance Use Covariates

Using Wave 2 data, we tested for measurement invariance across groups defined as never smoked vs. ever smoked and never drank vs. ever drank. The df , G^2 , BIC, and AIC are presented in Table 1. The significance test ($G^2_{diff}(28) = 32.88$, $p = .24$) indicated that the four classes were the same across the ever smoked vs. never smoked groups, and therefore, the class membership probabilities may be compared. The class membership probabilities by smoking are shown in Fig. 2. The probability of belonging to either the UH or UL classes do not appear to differ substantially across either smoking

TABLE 1
Measures of model fit

Model	G^2	df	BIC	AIC
2 Class	375.96	112	473.46	405.96
3 Class	190.56	104	340.05	236.56
4 Class	144.84	96	346.33	206.84
5 Class	114.4	88	367.89	192.4
4 Class—Gender With constraints	284.34	221	505.28	352.34
4 Class—Gender No constraints	257.99	193	660.88	381.99
4 Class—Ever Smoked With constraints	239.48	221	457.71	307.48
4 Class—Ever Smoked No constraints	206.60	193	604.54	330.60
4 Class—Ever Drank With constraints	271.63	221	489.75	339.63
4 Class—Ever Drank No constraints	221.63	193	619.37	345.63

Note: G^2 = log-likelihood statistic, df = degrees of freedom, BIC = Bayesian Information Criterion, AIC = Akaike Information Criterion (for BIC and AIC, smaller values are better).

TABLE 2
Class membership probabilities and item response probabilities for four-class model

	Class Label			
	Undifferentiated high	Intrinsic Motivation	Extrinsic Motivation	Undifferentiated low
Class membership probabilities	.09	.43	.40	.08
Item response probabilities				
Intrinsic motivation	.86	.82	.33	.03
Bored/Interested	.68	.87	.14	.11
Amotivation	.36	.27	.79	.22
Identified motivation	1.00	.73	.49	.00
Extrinsic motivation	.95	.32	.79	.01
Peer influence	.78	.35	.78	.06
Parental control	.92	.13	.54	.01

Note: Item response probabilities greater than .5 are in bold and are for responding in the high category for each item except bored/interested, which is the probability of responding as interested.

groups, but the probability of belonging to either the IM class or EX/AM class does appear to differ substantially across smoking groups. Those who had never smoked had a higher probability of belonging to the IM class, whereas those who had ever smoked had a higher probability of belonging to the EX/AM class.

Measurement invariance across the ever drank vs. never drank groups did not hold according to the significance test ($G^2_{\text{diff}}(28) = 44, p = .028$). Therefore, the latent classes cannot be interpreted as the same across the drinking groups and meaningful comparisons of class membership probabilities cannot be made.

DISCUSSION

In this sample, four motivational profiles best described the students, the majority of whom were either intrinsically motivated, or were extrinsically motivated and/or amotivated. Results indicated that TW did influence motivational profiles in the desired direction; TW youth were more likely to be in the IM class and less likely to be in the EX/AM class than the control youth. Finally, compared to those who ever smoked, those who had never smoked had a higher probability of belonging to the IM class and lower probability of belonging to the EX/AM, UH, and UL classes. We could not make any conclusions about alcohol use.

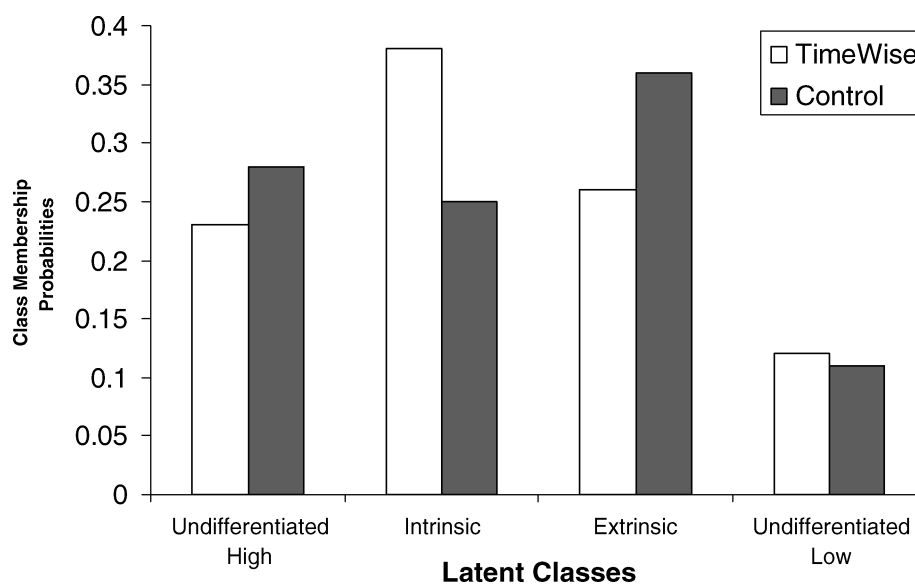


FIG. 1. Class membership probabilities by intervention condition at Wave 2.

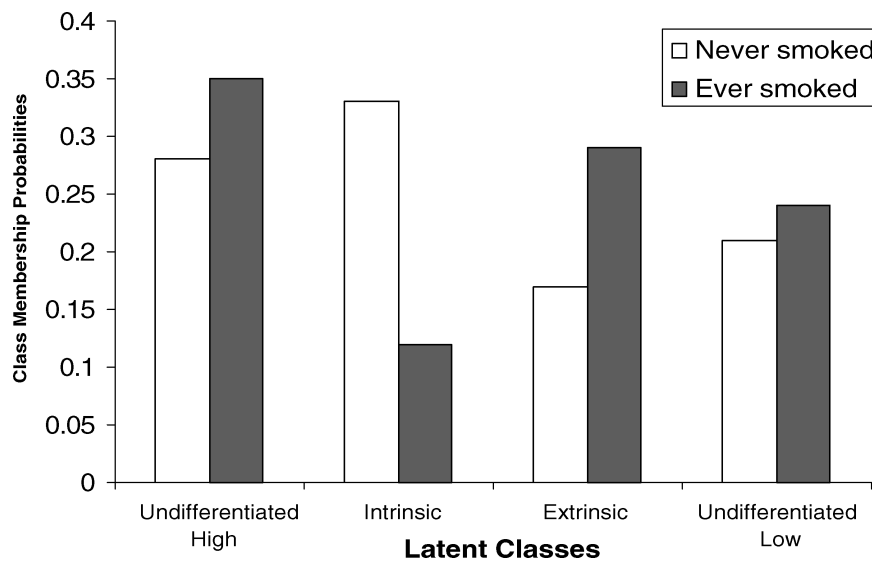


FIG. 2. Class membership probabilities by smoking use.

These results suggest that TW may be more effective by tailoring it to target individual needs based on motivational styles. Specifically, students who report high levels of intrinsic and identified motivation and are already interested and not bored in their activities would benefit from lessons that simply support their volitional behavior and provide resources that would expose them to new activities. This strategy would allow them to continue to make self-determined choices in their leisure time as they mature.

In contrast, for the 40% of students who were classified in the EX/AM group, a different strategy may be more effective. These students may be associated with highest risk; in this case with cigarette smoking. In a recent study on the association between extrinsic life goals and adolescent health risk behaviors, Williams et al. (24) concluded that adolescent smokers endorsed extrinsic values (e.g., wealth, fame) significantly more than non-smoking adolescents, and that their extrinsic values and overall risk behavior scores are associated. To tailor TW, lessons focused on ways to ignite passions through learning how to self-regulate their own actions may help youth develop self-regulation. This approach would require them to better understand their own reasons for action, the influence of peers on their behavior, and the role of parental influence. It would also provide more support for these youth in terms of goal setting and achievement.

Although only 9% of the sample youth who smoked (vs. never) had a higher likelihood of being in the UH group. These may be particularly exuberant and willing to try anything for any reason. They may be in a perpetual state of readiness for action and adventure, and may be particularly notorious among peers and particularly susceptible to external influence. For such youth, the best effort may be to direct such exuberance *in a healthy direction*, in lieu of attempting to harness or reduce high levels of energy (e.g., 25). By providing them with constructive

and healthy avenues for action and engagement, aimless exploration of harmful behaviors may be avoided.

Youth in the UL class present a unique challenge. They report low levels of all motivation types, including amotivation and extrinsic motivation. It may be that these youth are extremely internalized and tend to shut out most external influences and experiences. Thus, this group may be highly selective about their interests, closed-off to having interests, or not know what their interests are. Possibly the most salient approach for this class would be a more involved dosage of the interest development and overcoming obstacles component of the curriculum.

The undifferentiated classes identified in this study are a novel contribution to the motivation literature and warrant further exploration. These classes indicate that some youth are either motivated (regardless of why) or totally unmotivated, and that youth who have ever smoked are more likely to be in these classes compared to those who haven't smoked.

Future Direction, Considerations, and Conclusion

The previous discussion focused on the content of the intervention and how to more specifically tailor it to meet individual needs. Collins et al. (26) suggest that the increased individual relevance inherent in this strategy may result in more effective programs at a lower cost than traditional, fixed-component interventions. They suggest that this approach may also be more efficient and less vulnerable to noncompliance.

Another consideration is the process or delivery strategies used in the lessons. For example, although not addressed in the analyses, adolescents in the EX/AM class may benefit from very concrete activities, although this is subject to empirical verification. In addition, social learning theory could be used more than it already was to engineer more peer interactions and enacting situations where students get to practice recognizing and developing their own interests.

How an ontogenetic approach would work out in a school-based classroom presents a challenge to prevention scientists and school administrators. Teachers already have their hands full in the classroom, and without support from another teacher or aide, the ability to parse students into different groups and work on parallel but different activities would be a challenge. One way to address this challenge is to develop an after-school program to support the universally provided TW lesson. Another way is to provide significantly more technical support and consultation to school staff, at the outset and for the duration of the program. This might include helping teachers identify the lessons relevant to risk profiles, tailor activities accordingly, and locate resources to facilitate program tailoring. One such resource may be older students interested in adopting a mentor role.

Another concern in a school-based context is using a questionnaire as a diagnostic tool. We are not suggesting this happen based on our limited analyses. Rather, we are suggesting that more research and thought is needed along these lines to determine the viability of doing so. The risk of labeling students, as well as using a questionnaire for more than research and data collection is daunting and requires much more consideration. Finally, there are obviously other risk factors to consider if one were to attempt to develop a system by which to tailor individualized components of an intervention.

Although there are hypothesized practical and clinical advantages of adaptive interventions relative to universal strategies, this is an area that would benefit from much more empirical investigation. We have presented a preliminary step in establishing the feasibility and utility of targeted intervention approaches that address factors that seem to be important and relevant in an adolescent's life. However, effectively using this type of strategy will require additional research in areas including measurement, development, content, training, and delivery.

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Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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