# Profiles of adolescent leisure motivation and substance use in the HealthWise South Africa research trial: a person-centered approach

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## Abstract

Engaging in intrinsically motivated behaviors, both within and outside of the leisure context, is associated with well-being. However, individuals can be driven by multiple types of motivation simultaneously, and the impact of constellations of leisure motivation is relatively unknown. The current study uses South African adolescents in the HealthWise South Africa efficacy trial (N¼42,204; Mage¼414.0) to identify profiles of leisure motivation, examine the association between profiles and substance use, and evaluate the impact of HealthWise on changes in motivation profiles over time. Results indicate three distinct profiles: high consistent motivation, low consistent motivation, and high intrinsic motivation. Members of the high intrinsic profile had the lowest odds of substance use. Profiles were fairly stable across all time points except for females in a high-training intervention school. Results illustrate the importance of identifying and understanding typologies of leisure motivation and health across time, which can be used to promote positive development in adolescents.

**Keywords:** Adolescent; leisure motivation; latent transition analysis; South Africa; substance use.

It is well-documented that within the developmental period of adolescence, leisure provides a context for health-promoting behaviors. At the same time, adolescent leisure can be a context for risky behaviors such as substance use and risky sex (Caldwell, Baldwin, Walls, & Smith, 2004). Understanding what drives adolescents to engage in health-promoting or risky behaviors is important because there is a connection between self-determined behaviors and greater health and well-being (Ryan & Deci, 2000).

Self-determination theory (Ryan & Deci, 2000) is particularly useful in helping understand what drives adolescents to do what they do in leisure because it provides a framework for identifying the degree to which adolescents' behaviors are autonomous or controlled. As young people move through adolescence, the degree to which they can experience autonomy in leisure is often a contested area. This is due to factors such as parental control and support, peer influence, and available resources, resulting in behaviour enacted along a continuum of completely self-regulated and intrinsically motivated to completely controlled and extrinsically regulated.

It is unlikely, however, that all behavior is driven by only one type of motivation, which has been the common approach to understanding leisure motivation. It is more likely that adolescents are driven to engage in leisure activities for co-occurring reasons. Thus, one question we address in this study is whether there are profiles comprising different combinations of leisure motivation. A second question we address focuses on understanding whether these profiles are associated with healthy or unhealthy outcomes. For example, what happens if an adolescent has high levels of intrinsic and extrinsic motivation? Is this just as risky as someone who is primarily driven by extrinsic motivation? Furthermore, how do these profiles change over time? Consistent with the multiple types of growth and development that occur during adolescence, there is evidence that changes occur in leisure motivation across time (e.g., Sharp, Caldwell, Graham, & Ridenour, 2006). We therefore also sought to understand whether profiles of leisure motivation change across time.

Finally, from a prevention perspective, we ask whether an intervention targeted at changing leisure motivation was successful in doing so. This would allow us to bridge the gap between basic research and prevention practice.

The study setting is an underresourced area near Cape Town, South Africa, where adolescents have few healthy and stimulating leisure opportunities. They are often bored and frequently engage in risk behaviors as a way of having fun. For example, Wegner (2011) conducted a photo-elicitation study with local youth regarding how they spend their leisure time. One emerging theme titled "no entry-no exit" related to the combination of poverty within the community and the lack of available leisure resources and opportunities. Ultimately, Wegner found youth experienced boredom in leisure and frequently engaged in risk behavior as a means of having fun. Contextual factors such as these motivated the intervention described in this study. The intervention was developed to enhance healthy leisure through lessons on motivation and learning about community resources to mitigate or prevent substance use and risky sexual behavior.

To summarize, the purposes of the current article are to identify profiles of adolescent leisure motivation, their association with adolescent risk behavior, whether profiles change over time, and whether a leisure-focused intervention impacts changes in profiles over time. The context was ideally suited to address these purposes given the opportunities for growth in healthy leisure.

**Self-Determination Theory**

This study draws on self-determination theory (SDT; Ryan & Deci, 2000), which focuses on human needs and motivation as the foundation for positive personal growth. SDT posits

humans have three basic psychological needs: autonomy, competence, and relatedness. Provided these needs are met, individuals will be intrinsically motivated, displaying the "tendency to seek out novelty and challenges, to extend and exercise one's capacities, to explore, and to learn" (Ryan & Deci, p. 70). These intrinsically motivated behaviors are also labeled autonomous behavior (Hagger et al., 2014). However, if individuals do not fully experience autonomy, competence, or relatedness, they will either be amotivated (acting without purpose) or exhibit extrinsic motivation (acting because of external compulsion). Behaviors driven by a form of external compulsion are also labeled controlled behavior (Hagger et al.).

As a component of SDT, Ryan and Deci (2000) propose organismic integration theory (OIT), in which intrinsic motivation and the various types of extrinsic motivation are arranged along a continuum based on their associated levels of autonomy. Intrinsic motivation and amotivation are on the extreme ends of this continuum. Arranged between them, from least to most autonomous, are the subtypes of extrinsic motivation: external, introjected, identified, and integrated regulation. External regulation occurs when action is motivated completely by outside forces, typically in the form of a potential reward or punishment. With introjected regulation, behavior is motivated by the potential of avoiding negative emotional states (e.g., guilt, anxiety) or attaining ego rewards (e.g., pride), often based on social comparisons (Ryan & Connell, 1989). Identified regulation occurs when a valued goal motivates behavior and thus is purposeful. In the case of integrated regulation, a goal-focused motivation is accepted as part of the self and is in line with one's values but lacks the inherent enjoyment of intrinsic motivation. Some have argued that integrated regulation is not exhibited until adulthood due to the high-level cognitive capacities required (Vallerand, 1997).

There is theoretical and empirical evidence that motivation plays an important role in human development. Waterman (2004) discussed the importance of intrinsic motivation for optimal identity development in adolescence and early adulthood. He said that if individuals select goals, values, and beliefs that are intrinsically motivating, they will have identities that are a better fit with their strengths, allowing them to reach their full potential. Larson (2000) also suggested intrinsic motivation is one component of initiative, or the capacity to act autonomously. He argued that the capacity for autonomous action is crucial to adult success in a modern Western society where, rather than having a limited of number of choices in domains such as career and family, one's life course is extremely flexible. Therefore, it appears to be important for individuals to develop intrinsic motivation prior to entering adulthood.

**Motivation in adolescents' leisure activities**

Globally, between one-quarter and one-half of youth's waking hours are typically discretionary, meaning they are not occupied by obligatory activities such as school, chores, and maintenance tasks (Larson & Verma, 1999). Free time represents a sizable amount of time with the potential to influence adolescent development and especially important for developing and experiencing intrinsic motivation. Leisure is an important subset of free time where youth are not engaged in daily maintenance or other discretionary activities. Further,

3

leisure consists of behaviors that are, theoretically, self-determined and enjoyable. Leisure provides developmental opportunities that may not exist to the same extent within the school, work, or home environment (Caldwell & Smith, 2006). For example, although school presents adolescents with both challenge and complexity, it presents fewer opportunities to experience intrinsic motivation and autonomy (Larson, 2000).

Leisure motivation also changes developmentally. Youth tend to decrease in their levels of intrinsic motivation and increase in amotivation over time (Sharp et al., 2006). Within educational contexts, declining intrinsic motivation for learning is often ascribed to changing cognitive abilities and how greater cognitive maturation and social comparison leads to a better understanding of achievement relative to their peers (Wigfield & Eccles, 2002).

## Leisure motivation and health behaviour

SDT posits self-determined behaviors are generally associated with greater health and well-being; it was later expanded to model changes in health behavior (Ryan, Patrick, Deci, & Williams, 2008). Among the positive health outcomes reported was the negative association between intrinsic motivation and substance use behavior (Zeldman, Ryan, & Fiscella, 2004). A recent meta-analysis of SDT-based health outcomes demonstrates continued support for the association between SDT and health behavior (Ng et al., 2012). Pooled results from 184 sources found amotivation negatively related to mental health and greater self-regulated motivation positively associated with positive mental health indicators and negatively associated with negative mental health indicators.

In adolescence, self-determined behavior and intrinsic motivation are tied to key developmental tasks such as autonomous behavior, development of interest, and identity development (Waterman, 2004), whereas extrinsic motivation and amotivation are associated with negative outcomes. Although extrinsic motivation is beneficial in moderation, if overvalued it may be associated with reductions in health and well-being (Sheldon, Ryan, Deci, & Kasser, 2004). Amotivation, characterized by a lack of intentionality, purpose, or agency, has also been associated with lower well-being (Sheldon et al.). Adolescents who lack intrinsic motivation during their leisure time are more likely to become bored (Weissinger, Caldwell, & Bandalos, 1992), which has been associated with substance use behaviors (Weybright, Caldwell, Ram, Smith, & Wegner, 2015) and risky sexual behavior (Miller et al., 2014). Other research has demonstrated a direct connection between intrinsic motivation and risk behavior including antisocial behavior (e.g., Mahoney & Stattin, 2000) and substance use. Alcohol consumption is associated with less intrinsic motivation (Shamloo & Cox, 2010) and greater extrinsic motivation (Knee & Neighbors, 2002; Rockafellow & Saules, 2006). Although the connection between substance use and motivation needs further investigation, available research suggests both direct and indirect associations exist.

## Variable- and person-centered strategies for studying motivation

Previous research on leisure motivation has typically been variable-centered, focusing on relations between motivation-related variables and outcomes of interest. Within this approach, motivation is usually measured one of two ways. Some researchers have examined only one type of motivation at a time. Often these studies focus on the presence or absence of one motivational type and/or its relation to other constructs such as physical activity and well-being (Owen, Astell-Burt, & Lonsdale, 2013; Padhy, Valli, Pienyu, Padiri, & Chelli, 2015). Another commonly used measurement strategy is based on OIT. In educational research, Ryan and colleagues (Grolnick & Ryan, 1987; Ryan & Connell, 1989) combined scores on the motivational subscales (e.g., intrinsic motivation) into a single score called a Relative Autonomy Index.

Variable-centered approaches may not be sufficient for fully understanding adolescent leisure motivation (Caldwell, Patrick, Smith, Palen, & Wegner, 2010). When examining complex, multifaceted constructs such as motivation, knowing the associations between variables does not necessarily translate into descriptions of individuals or types of individuals. For example, Caldwell and colleagues (2010) used SDT scales to identify changes in leisure motivation over time, but this does not inform whether unmeasured subgroups are present in the data. A person-centered approach is particularly useful in identifying groups, or profiles, of individuals who share specific characteristics and can occupy and move between over time (Bergman & Magnusson, 1997).

A person-centered approach to motivation has been used in studies of academics and tourism (Hayenga & Corpus, 2010; Kim & Ritchie, 2012; Wormington, Corpus, & Anderson, 2012). However, studies of leisure motivation also lend themselves particularly well to a person-centered approach. Prior qualitative work on leisure motivation suggests youth experience multiple types of motivation within the same activity (Palen, Caldwell, Smith, Gleeson, & Patrick, 2011). Youth also typically participate in multiple leisure activities (Bartko & Eccles, 2003), and it is possible they have different motivational experiences in each. This idea of concurrent motivation is consistent with previous research showing adolescents typically have different subjective identity-related experiences across their leisure repertoire (Coatsworth, Palen, Sharp, & Ferrer-Wreder, 2006).

SDT-based motivational profiles have been identified in adolescents but not specific to leisure motivation. Cluster analysis was used to identify motivational profiles in adolescents in educational settings (Hayenga & Corpus, 2010; Wormington et al., 2012), engagement in prosocial behaviors (e.g., volunteerism), and abstaining from health-risk behaviors (e.g., marijuana use; Hardy, Dollahite, Johnson, & Christensen, 2015). In these studies, results identified four motivational profiles. Hayenga and Corpus as well as Wormington and colleagues found both consistent (e.g., all low, all high) and mixed (e.g., high intrinsic and low extrinsic) profiles, while Hardy and colleagues identified three consistent (low, middle, and high motivation) and one mixed (low and high motivation depending upon behavior) profile. In the current study, we expect to identify multiple profiles of motivation with both consistent and mixed motivations.

Results of motivational profiles in other domains suggest knowing an individual's score on one motivational subscale or composite does not accurately represent the totality of

his or her experiences. Although we can hypothesize about different profiles of leisure motivation within individuals, this has not been fully explored empirically and not as applied to leisure behavior. Person-centered approaches allow profiles to emerge. They also allow for examination of how profiles relate to outcomes and how individuals move between profiles over time.

## The current study

Data for this study came from a longitudinal efficacy trial of HealthWise South Africa (HW), a school-based intervention targeting leisure and life skills as well as reducing substance use and risky sexual behavior (Caldwell et al., 2004). HW was taught over two years in grades 8 and 9. Lessons in the HW curriculum are theoretically framed by the concepts of self-awareness; skills development; community integration; and knowledge, analysis, and synthesis. While lessons collectively serve to promote self-determined healthy leisure behaviors, the grade 9 module focuses explicitly on leisure motivation. The placement of motivation content in grade 9 was intentional to match students' developmental readiness for the information. Motivation-related activities prompted students to reflect on their motivations for current leisure use and taught skills that focused on avoiding boredom, managing leisure interests, and accessing community resources. These activities were intended to increase students' involvement in intrinsically motivated pastimes while decreasing extrinsic motivation and amotivation.

Prior empirical work suggests HW was successful in achieving its intended impact. Intervention students exhibited greater increases in intrinsic motivation and decreases in amotivation and introjected motivation compared to control students when motivation was measured using a variable-centered approach (Caldwell et al., 2010). The results, however, did not hold for all HW schools. There was one high-training intervention school where teachers had better attendance at formal teacher training, greater engagement with the curriculum, and exceptional levels of program support from school administration (Caldwell et al., 2008). We reasoned this school would exhibit stronger program effects than those from the other three HW schools. Of the 25 teachers implementing HW in 2005, 10 teachers from the high-training school attended the formal teacher training and 15 teachers received an individual training session of shorter duration (Caldwell et al., 2008). At each of the other experimental schools, one teacher was identified as the HW liaison and given the responsibility to communicate the training to teachers not in attendance.

The aims of the current study are three-fold. First, we will identify and describe patterns of leisure motivation among a sample of South African adolescents. In hypothesis 1, we offer that multiple motivational profiles will emerge, including consistent and mixed. Second, we will examine cross-sectional associations between profiles from hypothesis 1 and recent use of various substances. In hypothesis 2, we suggest that profiles characterized by high intrinsic motivation will be less likely to engage in substance use while profiles characterized by high extrinsic motivation or amotivation will be more likely to engage in substance use. Finally, we test whether the HW intervention impacts change in motivational profiles. We expect students from intervention schools and students from a high-training intervention school will be more likely than students from control schools to exhibit profiles

6

characterized by high levels of intrinsic motivation (hypothesis 3a). Due to the focus on leisure motivation in grade 9, we would expect to see the greatest shifts to intrinsically motivated leisure profiles between assessments at the beginning and end of ninth grade (hypothesis 3b). Due to evidence of gender differences in motivation (e.g., Vallerand et al., 1992), we will test for gender differences.

## Methods

### Sample

The sample consisted of 2,404 students from Mitchell's Plain, a low-income township near Cape Town. Of the 25 area high schools, six were excluded due to concerns about their ability to functionally participate (e.g., lack of administrative support, disorganization). Of the remaining schools, four were randomly selected to receive the HW curriculum ($n_{Time1}$ = 902; high-training school, $n_{Time1}$ = 312), and five ($n_{Time1}$ = 1,291) were subjectively matched to treatment schools on socioeconomic status, school size, and religion (Coffman, Smith, Flisher, & Caldwell, 2011).

Students in all schools completed identical assessments on personal digital assistants bi-annually near the beginning and end of each school year. The assessments used in the current study are from the beginning and ends of eighth and ninth, and the beginning of tenth grade, for a total of five data collection time points. School absence and drop-out are relatively high among the target population; therefore, between 5% and 12% of the sample was lost to attrition at each time point ($n_{Time1}$ = 2,404; $n_{Time5}$ = 1,364). The mean age of all participants at baseline was 14.0 years old (SD¼4.86); they were 51% female; and most participants were Colored (mixed ancestry; 86%), with the rest of the students being Black (9%), White (4%), and Indian or other (<1%). Institutional review board approval for the current study was obtained from study-affiliated universities and school administration.

### Measures

*Motivation*. Participants completed a modified version of the Free Time Motivation Scale for Adolescents (Baldwin & Caldwell, 2003), assessing participants' motivation in their leisure activities using five motivation subscales of intrinsic, identified, introjected, extrinsic motivation, and amotivation. Each scale comprised between two and six items, with response options ranging from strongly disagree to strongly agree (see Table 1).

*Substance use*. Participants responded to a series of questions regarding their use of alcohol, cigarettes, marijuana, and inhalants. Participants who responded affirmatively to a leading item about lifetime use of these substances were asked a follow-up question about whether they had used each of these substances in the past month. The past-month item was used in the current study.

**Table 1.** Descriptive information for free time motivation subscales and substance use items.

| Subscale | Number of items | Sample item | Grand mean (SD) | T1 | T2 | T3 | T4 | T5 |
|---|---|---|---|---|---|---|---|---|
| | | | | Inter-item reliability | | | | |
| Intrinsic motivation | 2 | I do what I do in my free time because I want to. | 2.88 (0.93) | .58 | .65 | .65 | .67 | .74 |
| Identified motivation | 6 | I do what I do in my free time because I develop skills that I can use later in life. | 2.64 (0.82) | .78 | .79 | .81 | .79 | .82 |
| Introjected motivation | 3 | I do what I do in my free time because I want people to like me. | 1.62 (1.00) | .65 | .69 | .73 | .71 | .74 |
| Extrinsic motivation | 3 | I do what I do in my free time because my parents expect me to. | 1.79 (1.10) | .76 | .75 | .82 | .81 | .83 |
| Amotivation | 3 | I don't know why I do my free time activities, nothing much interests me. | 1.67 (1.03) | .72 | .79 | .80 | .83 | .84 |
| Alcohol | | | 0.22 (0.42) | | | | | |
| Cigarette | | | 0.32 (0.47) | | | | | |
| Marijuana | | | 0.11 (0.31) | | | | | |
| Inhalants | | | 0.03 (0.16) | | | | | |

Note: T = time. SD = standard deviation. Motivation items range from 0 = *strongly disagree* to 4 = *strongly agree*. Substance use items are dichotomous where 0 = not past month use and 1 = past month use. Grand mean refers to the average across all time points.

**Table 2.** Descriptives and measures use by cluster.

| Scale | Cluster | | |
|---|---|---|---|
| | Low consistent motivation | High consistent motivation | High intrinsic motivation |
| Proportion of Total Sample | 26% | 44% | 30% |
| Descriptives | | | |
|   Male | 54% | 54% | 38% |
|   Treatment | 44% | 42% | 37% |
| Motivation M (SD) | | | |
|   Intrinsic motivation | 1.90 (0.81) | 3.15 (0.63) | 3.43 (0.56) |
|   Identified motivation | 1.84 (0.68) | 3.01 (0.58) | 2.96 (0.63) |
|   Introjected motivation | 1.52 (0.75) | 2.41 (0.85) | 0.95 (0.74) |
|   Extrinsic motivation | 1.62 (0.77) | 2.82 (0.72) | 0.95 (0.80) |
|   Amotivation | 1.81 (0.79) | 2.36 (0.94) | 0.91 (0.75) |
| Substance Use | | | |
|   Alcohol | 20% | 15% | 13% |
|   Tobacco | 26% | 27% | 20% |
|   Marijuana | 10% | 7% | 3% |
|   Inhalants | 6% | 2% | 1% |

Note. M = mean; SD = standard deviation; % = percentage. Motivation scale scores range from 0 to 4.

## Analytic strategy

K-means cluster analysis (SAS PROC FASTCLUS) was used to identify profiles of leisure motivation. We use the terms "cluster" in reference to the analytic approach and related parameters and "profile" in reference to results and implications. The number of clusters was determined by estimating models from two to nine clusters and evaluating cubic clustering criterion (CCC) and pseudo F statistic criteria as well as theoretical fit and interpretability (Clatworthy, Buick, Hankins, Weinman, & Horne, 2005). CCC (Sarle, 1983) is a measure of cluster deviation from expected distribution when data are drawn from a normal

distribution. Pseudo F (Calinski & Harabasz, 1974) captures cluster separation. For both criteria, a higher value indicates a better cluster solution.

Prior to analysis, data were arranged in long format such that cluster membership had the same interpretation across time. This solution was validated by conducting separate cluster analyses of each time point, demonstrating the overall solution accurately represented any one time point. Logistic regression was used to determine whether and how cluster membership was associated with concurrent past-month substance use. Due to differences in substance use by gender across time, analyses controlled for gender (Chen & Jacobson, 2012).

Latent transition analysis (LTA) was then conducted using WinLTA (Collins, Lanza, Schafer, & Flaherty, 2002) to describe how students shifted between clusters over time and to determine whether this differed by treatment condition. LTA is a longitudinal extension of latent class analysis, a person-centered approach in which discrete manifest variables are used to classify individuals according to underlying, unobservable constructs. In LTA, latent classes are discrete stages of development (i.e., latent statuses). The LTA framework can test competing models of how people move between these stages over time (i.e., stage-sequential development) and provides a parsimonious approach to analyzing complex arrays of longitudinal data (Collins & Lanza, 2010).

In the present analysis, latent statuses were the clusters identified by the initial cluster analysis. Students' cluster membership at each of the five data collection time points was read into the Win-LTA program, which compared competing models where fit was assessed with the $G^2$ statistic. Under certain conditions, $G^2$ approximates a $\chi^2$ distribution. However, given that latent class modeling involves large contingency tables, some cells can be sparsely populated, resulting in different $G^2$ and $\chi^2$ distributions. Therefore, hypothesis testing for latent transition models is less exact than with other statistical techniques. A model is considered a reasonable fit if $G^2$ is smaller than associated degrees of freedom. The comparative fit between two models is assessed using $\chi^2$ difference tests (Collins, Fidler, Wugalter, & Long, 1993) with modified Bonferroni adjustments (Holm, 1979). Given that WinLTA, by default, uses the expectation maximization algorithm to arrive at parameter estimates, missing data are assumed to be missing at random, and this is accounted for in models (Collins et al., 2002) resulting in unbiased estimates (Schafer, 1997). To confirm data are missing completely at random (MCAR), the $G^2$ fit for the saturated model to the incomplete data is compared to the associated degrees of freedom (Collins et al., 2002). If data are found missing not at random, then model residuals are used to specify problems with fit.

## Results

Motivation scale means are available in Table 1 separated by time point, gender, and treatment in Supplementary Table 1. Motivation scales were assessed for nonnormality using Kim's (2013) criteria and found to be normally distributed ($Range_{skew}$ = - 0.8 to 0.2; $Range_{kurtosis}$ = - 0.8 to 0.5).

## Cluster analysis

Cluster criteria pointed to a two (pseudo F) and three (CCC) cluster solution (see Supplementary Table 2). These solutions were evaluated for interpretability (see Supplementary Table 3). The cluster means for the three and four cluster solutions were compared and resulted in the same high intrinsic cluster. However, the two-cluster solution merged the remaining clusters of the three-cluster solution (low consistent $M_{range}$ = 1.52–1.90; high consistent $M_{range}$ = 2.36–3.15) into a medium motivation cluster ($M_{range}$ = 2.21–2.78). Given the degree of separation in the three-cluster solution, it served as the final cluster solution. This solution consisted of three profiles: high on all types of motivation (High Consistent; $M_{range}$ = 2.36–3.15), low on all types of motivation (Low Consistent; $M_{range}$ = 1.52–1.90), and high on intrinsic (i.e., intrinsic and identified; $M_{range}$ = 2.96–3.43) while low on introjected, extrinsic, and amotivation ($M_{range}$ = 0.91–0.95; High Intrinsic Motivation; see Table 2). Results supported the first hypothesis suggesting multiple profiles of motivation. Across all time points, girls were more likely than boys to be in the high intrinsic motivation profile ($\chi2(2)$ = 291.0, $p<.001$).

## Cluster membership and substance use

We conducted a series of logistic regressions to test for associations between cluster membership and past-month alcohol, cigarette, marijuana, and inhalant use while controlling for gender. Given our hypothesis 2 about intrinsic motivation and substance use, the high intrinsic motivation profile served as the reference group. Analyses showed that compared to students in the high intrinsic motivation profile, students in the high and low consistent motivation profiles had significantly higher odds of past-month use of cigarettes, marijuana, and inhalants, with odds especially high for inhalant use (see Table 3). The low consistent motivation profile also had significantly higher odds of past-month alcohol but the high consistent motivation profile did not. When using the low consistent motivation profile as the reference group, we found the high intrinsic and high consistent were all significantly less likely to use substances in the past month except cigarette use in the high consistent profile.

## Latent transition analysis

Hypotheses 3a and 3b addressed whether an intervention could shift motivational profiles. We sought to understand whether HW was effective in helping youth move to a more intrinsically motivated profile, if this shift was stronger for the high-training school, and if this shift occurred from the beginning to end of grade 9. Preliminary analytic steps conducted included model specification, specification of measurement parameters, and testing for invariance in gender and group.

**Model specification**. Preliminary analyses testing for gender invariance showed a model in which the cluster measurement parameters were freely estimated ($G^2(7719)$¼706) fit significantly better than a model in which parameters were constrained to be equal across genders ($G^2(7720)$¼714; $G^2diff(1)$¼48, $p<.01$) indicating significant gender differences.

**Table 3.** Conditional odds ratios for cluster membership predicting substance use.

| | Substance | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Alcohol | | Cigarettes | | Marijuana | | Inhalants | |
| Cluster | Odds Ratio (95% C. I.) | p | Odds Ratio (95% C. I.) | p | Odds Ratio (95% C. I.) | p | Odds Ratio (95% C. I.) | p |
| High Intrinsic Motivation as Reference Group | | | | | | | | |
| High consistent motivation | 1.1 (0.8–1.5) | .4560 | 1.5 (1.2–1.9) | .0015 | 2.2 (1.3–3.7) | .0046 | 3.4 (1.1–9.8) | .0273 |
| Low consistent motivation | 1.5 (1.1–2.1) | .0067 | 1.4 (1.1–1.8) | .0133 | 3.4 (2.0–5.9) | <.0001 | 9.0 (3.2–25.8) | <.0001 |
| Low consistent Motivation as Reference Group | | | | | | | | |
| High consistent motivation | 0.7 (0.6–0.9) | .0224 | 1.1 (0.8–1.3) | .6900 | 0.6 (0.4–0.9) | .0193 | 0.4 (0.2–0.6) | .0004 |
| High intrinsic motivation | 0.7 (0.5–0.9) | .0067 | 0.7 (0.5–0.9) | .0133 | 0.3 (0.2–0.5) | <.0001 | 0.1 (0.0–0.3) | <.0001 |

*Note*: C.I. = confidence interval; *p* = p value.

Data were found to be MCAR ($G2(2155) = 1547$) in the freely estimated model. Consequently, separate models were fit for boys and girls. These models estimated parameters specific to measurement, group membership, and transition.

**Measurement parameters**. The two sets of measurement parameters included the probability of a given response to the treatment group indicator conditional on treatment group status and the probability of cluster membership. For the sake of parsimony, all probabilities of a treatment/control group "correct" response (indicating correctly one is in a control group school) were fixed to be equal within each of the two sets of measurement parameters, as were all probabilities of an "incorrect" response (indicating one is a control group school when one is attending a treatment group school). In the final treatment/control model, the probabilities of being correctly classified on treatment group were estimated at >.99 for both genders while the probabilities of being correctly classified on cluster membership were estimated as .83 for both genders.

**Group membership parameters.** Group measurement parameters indicated the proportion of participants in each treatment group and cluster at baseline. In the final treatment/control models, the probability of being in the control group were .58 for both genders, consistent with the actual proportion of control group assignment. Models were separately fit by gender to determine if treatment and control groups had the same proportions in each cluster at baseline. For boys, a model in which cluster membership probabilities were freely estimated ($G^2(7744) = 528$) did not fit significantly better than a model with parameters constrained to be equal across treatment groups ($G^2(7746) = 532$; $G^2diff(4) = 4$, *n.s.*; data MCAR $G^2(44765) = 1285$) therefore, all boys were grouped together. For girls, a model in which the cluster membership probabilities were freely estimated ($G^2(7744) = 615$; data MCAR $G^2(43301) = 1284$) did fit significantly better than where parameters were constrained to be equal across treatment group ($G^2(7746) = 621$; $G^2diff(2) = 6$, $p < .05$; using modified Bonferroni adjusted *p*-values), indicating the two groups had significantly different probabilities of cluster membership at baseline and needed two separate sets of parameters (see Table 4).

**Table 4.** Probabilities of cluster membership.

| | Beg. 8th Grade | End 8th Grade | Beg. 9th Grade | End 9th Grade | Beg. 10th Grade |
|---|---|---|---|---|---|
| **All boys** | | | | | |
| High consistent motivation | .54 | .46 | .40 | .37 | .34 |
| Low consistent motivation | .27 | .32 | .36 | .38 | .39 |
| High intrinsic motivation | .19 | .22 | .24 | .26 | .27 |
| **Control girls** | | | | | |
| High consistent motivation | .42 | .28 | .24 | .22 | .18 |
| Low consistent motivation | .17 | .24 | .28 | .26 | .31 |
| High intrinsic motivation | .42 | .48 | .48 | .52 | .52 |
| **All HealthWise girls** | | | | | |
| High consistent motivation | .43 | .30 | .26 | .23 | .19 |
| Low consistent motivation | .23 | .28 | .32 | .29 | .34 |
| High intrinsic motivation | .34 | .42 | .43 | .47 | .47 |
| **High-training girls** | | | | | |
| High consistent motivation | .45 | .35 | .27 | .24 | .19 |
| Low consistent motivation | .25 | .29 | .32 | .24 | .27 |
| High intrinsic motivation | .30 | .36 | .41 | .52 | .55 |

**Transition parameters.** Transition parameters represented the probability of being in a given cluster, conditional on treatment group and cluster membership at the preceding time point. A series of latent transition analyses were conducted comparing control students with intervention students overall, intervention students from the beginning to the end of grade 9, and then control students with intervention students from the hightraining school. Due to gender differences, results are separate for boys and girls.

For boys, the best-fitting models included transitions constrained to be equal across treatment group and time point, a model which also held when comparing the hightraining school and time point. Therefore, all boys were represented by the same set of cluster membership parameters and transition parameters (see Table 5). For boys, hypotheses 3a and 3b were not supported. Boys in the high intrinsic motivation profile at one time point were very likely (.94 probability) to remain in that profile while low and high consistent motivation profiles were slightly less likely to remain in those profiles (.84 and .76, respectively). The highest transition probability was for boys moving from the high consistent to low consistent profile (.17), followed by the moving from the low consistent to high consistent (.15). The remaining probabilities for transitioning between profiles were much lower ($\leq$ .07).

For girls, the transition parameters were constrained to be equal across treatment groups but needed to be different for each time point. Results support hypotheses 3a and 3b. In the overall treatment/control analyses and the high-training/control analyses, the two groups had significantly different probabilities of profile membership at the baseline, with girls from the high-training school having a lower probability of being in the high intrinsic motivation profile and higher probabilities of being in the high and low consistent motivation profiles compared to girls in the control group. A series of models were tested to determine whether transition probabilities differed by treatment group and/or time point. A model in which the transition probabilities were constrained to be equal across both treatment and time point (G2(7746) = 621) was not a significantly better fit than one in which all parameters were freely estimated (G2(7744) = 614; G2*diff*(2) = 6, *p*<.05; using modified

Bonferroni adjusted *p*-values). When compared to a constrained model of females across the high-training and control schools (G2(456) = 420), the best-fitting model was one in which the transition between the beginning and end of grade 9 needed to differ for the high-training and control schools, as well as from the transitions between the other time points (G2(448) = 398; G2*diff*(8) = 21, p<.01; data MCAR G2(1480) = 714; see Table 5; using modified Bonferroni adjusted *p*-values). Results support hypothesis 3a.

**Table 5.** Cluster transition probabilities.

| | Cluster membership, subsequent assessment | | |
|---|---|---|---|
| Cluster membership, previous assessment | 1 | 2 | 3 |
| **All Boys, All Time Points** | | | |
| High intrinsic motivation | .94 | .04 | .02 |
| Low consistent motivation | .01 | .84 | .15 |
| High consistent motivation | .07 | .17 | .76 |
| **All Girls, Time 1→2, Time 2→3, Time 4→5** | | | |
| High intrinsic motivation | .95 | .05 | .00 |
| Low consistent motivation | .06 | .89 | .05 |
| High consistent motivation | .13 | .13 | .74 |
| **High-training HealthWise Girls, Time 3→Time 4** | | | |
| High intrinsic motivation | .99 | .00 | .01 |
| Low consistent motivation | .33 | .51 | .16 |
| High consistent motivation | .06 | .26 | .68 |

*Note*: Transitional probabilities are likelihood of latent statuses. Probabilities on the diagonals reflect stability while above and below diagonals represent movement between clusters.

An examination of this transition shows that girls from the high-training school who were in the high intrinsic motivation profile at the beginning of ninth grade were extremely likely (.99) to be in that same profile at the end of ninth grade. Stability (i.e., remaining in the same profile) for the other high-training girl profiles was much lower (≤.68) and lower than the all-boys and all-girls groups. Of note is the finding that girls from the high-training school who were in the low consistent motivation profile at the beginning of ninth grade have a .33 probability of transitioning to the high intrinsic motivation profile by the end of ninth grade. This transition is greater than the corresponding probability for the all-girls group (.06) and higher than any other probability of transition between statuses at any other time points in the high-training girls (≤.26). Unexpectedly, high-training girls in the high consistent motivation profile at the beginning of 9th grade have a .26 likelihood of moving to the low consistent motivation profile, which is higher than the corresponding probability for the all-boys (.17) and all girls groups (.13) at other time points.

**Discussion**

The current study sought to identify profiles of leisure motivation, how profiles were related to substance use, and how profiles changed over time for both the treatment and control groups. Hypothesis 1 was supported; three profiles (high intrinsic motivation, low consistent motivation, and high consistent motivation) were identified, allowing for a more nuanced look at leisure motivation than a typical variable-centered approach would allow. Hypothesis

2 was supported, finding students in the high and low consistent motivation profiles were more likely than those in the high intrinsic motivation profile to use tobacco, marijuana, and inhalants in the past month. Only students in the low consistent motivation profile were more likely to use alcohol. Students in the high consistent motivation profile were less likely than the low profile to use alcohol, marijuana, and inhalants while students in the high intrinsic motivation profile were less likely to use all substances. Finally, hypothesis 3 was partially supported. We did find a difference in the probability of profile membership for control, intervention, and high-training intervention students, but only for girls. In addition, the high-training girls demonstrated profile transitions from the beginning to end of grade 9.

### *Leisure motivation and a person-centered approach*

Findings support the notion that an individual can simultaneously hold multiple leisure motivations. The three profiles identified indicated some adolescents had relatively low levels of all types of motivation while others had relatively high levels of all types of motivation. This seems to indicate that it is the intensity of motivation that differentiates these two profile types. The third profile was unique from the other two because the adolescents in this profile mainly exhibited autonomous and goal-directed reasons for participating in leisure activities. Results are like those found when looking at motivation in educational contexts and related health behavior, including stable and mixed profiles. This approach allowed us to use exploratory methods to find profiles that best fit our data — profiles that would not have emerged in traditional variable centered approaches. We found gender differences in the prevalence of profile membership, suggesting females were more likely than males to be in the high intrinsic motivation profile. This is consistent with previous research on self-determination that found females demonstrate higher levels of self-determination and intrinsic motivation than males (Vallerand et al., 1992).

The importance of this person-centered approach is illustrated when looking at how motivation profiles related to the likelihood of substance use. Within the current study, we found high consistent motivation was like low consistent motivation related to substance use. On the other hand, being in the high intrinsic group appears to be protected against all forms of substance use. Effects such as these would be muddled and potentially hidden in analyses of a single type of motivation.

Findings are consistent with previous studies showing that self-determined behaviour is essential for well-being (Ryan & Deci, 2000) and non-self-determined behavior is associated with substance use (Chassin, Pitts, & Delucia, 1999; Williams, Hedberg, Cox, & Deci, 2000). It is less clear why adolescents in the high and low consistent motivation profiles had higher odds of substance use, although they did differ in that the low consistent motivation profile was associated with even higher odds of substance use than the high consistent motivation profile (except for cigarette use). This finding supports the need for additional research to understand better how motivation type may differentially contribute to substance use behaviors. Overall, it appears leisure motivation is an important risk and protective factor with regard to substance use.

It is prudent to consider results in light of historical and cultural influences on South African youth. The Population Registration and Group Areas Acts of 1950 served to racially

categorize and disenfranchise non-White South Africans through forced relocations and restricted access to public resources (among other restrictions). Although the Population Registration Act was repealed in 1991, the social impacts are still felt today. Compared to the United States, South African adolescents have fewer resources for and greater constraints against healthy leisure pursuits (Wegner, 2011; Xie et al., 2017). Unlike the United States, however, few non-White high schools in the Western Cape provide a variety of structured, supervised after-school activities, nor do they have the facilities to do so. Local sport practice fields and community centers that have sport and theater facilities do exist in communities but are often locked or unavailable to youth (Wegner, 2011). In addition to this idea of "no entry" into recreation opportunities, Wegner reported youth felt there was "no exit" from their current situation. This feeling of no control may contribute to low levels of autonomy and higher levels of amotivation or more autonomy controlling types of motivation.

### *Intervention effects*

A central question to this study was: If we did find profiles of motivation using a person-centered approach, could an intervention influence adolescents to become more intrinsically motivated? This is an especially compelling question due to the relationship between motivation and substance use.

As expected, we found intervention effects for adolescents in the high-training school, although there were gender differences. Females in the high-training school had the highest likelihood of any other group (vs. the all-boys and control girl groups) of remaining in the high intrinsic motivation profile (.99 vs .94 and .95 respectively) and moving from low consistent motivation to high intrinsic motivation profile, which also resulted in a lower likelihood of remaining in the low consistent motivation profile. Higher levels of self-determined behavior and intrinsic motivation in females as well as generally maturing earlier than males (Spear, 2000) may mean they are more responsive to interventions addressing intrinsic motivation. Such maturational differences may hold implications for timing of intervention delivery to ensure adolescents are developmentally ready to internalize curriculum content. Prior research on intrinsic motivation suggests it decreases over time in both academic and leisure contexts (Gottfried, Fleming, & Gottfried, 2001; Sharp et al., 2006). Within the current study, there is evidence that the intervention not only mitigated this decrease within high-training females but also increased the likelihood of staying intrinsically motivated over time. Although the leisure context is different from the academic context, it affords adolescents greater opportunities for SDT basic needs of autonomy, competence, and relatedness. This greater opportunity within leisure may also be counter-balancing any declines in intrinsic motivation within the academic context, allowing adolescents to be on a thriving trajectory to adulthood. These thriving adolescents assumingly have their basic needs fulfilled and are exploring their world in healthy, constructive ways rather than engaging in risk behaviors to meet such needs.

High-training girls also had a higher likelihood than control girls of moving from high consistent to low consistent motivation, although this likelihood was similar to the all-boys group. Effects for the high-training group were specific to the transition from the beginning to the end of ninth grade. Temporally, this corresponds to the teaching of the leisure

motivation session within ninth grade. One potential explanation for this change from high consistent to low consistent profile may be that students in the high training school developed greater awareness and knowledge related to motivation due to the ninth grade lesson. Process evaluation results found teachers in the high-training school covered a greater amount of the content within the motivation lesson; these teachers later commented that their students, in particular, lacked motivation (Caldwell et al., 2008). The greater comfort, awareness, and appreciation of the importance of the motivation lesson coupled with their perception of students lacking motivation may have not only influenced these trained educators, but this may have also trickled down to the students. Readers are reminded of the cultural context from which these data came which must be considered when interpreting results. Substance use and leisure motivation are influenced by environmental and cultural factors such as leisure opportunities and resources that may differ from one culture to another.

### *Limitations and future directions*

The current study provides a more nuanced view into leisure motivation profiles, how profiles are related to substance use behaviors, and how profiles change over time. However, there are a few limitations. In addition to the self-report nature of the study, the motivation-related items solicited responses generally about leisure activities and did so only twice a year. As a result, these items do not distinguish between a student who, for example, is intrinsically motivated to participate in theater classes from a student who is intrinsically motivated to use drugs and may conflate differing types of motivation occurring during the six-month time frame. Consequently, it is important for future motivational studies to take contextual factors into account and accommodate changes in motivation by collecting data more frequently. From a measurement perspective, a main construct of interest, intrinsic motivation, was measured with only two items. Future studies would benefit from approaches that reduce participant burden, such as planned missingness designs (Graham, Taylor, Olchowski, & Cumsille, 2006), while allowing for greater construct representation. An additional important next step will be to better understand the relationship between substance use, leisure motivation, and gender. Our study identifies associations between substance use and motivation, but it is also important to understand if substance use is being driven by changes in motivation or vice versa.

The current study contributes to the body of leisure motivation literature in a few different ways. The use of a person-centered approach allows us to draw inferences not available from a variable-centered perspective. Perhaps targeting individuals in the overall low consistent motivation profile for an intervention will help to move a greater proportion of them into the high intrinsic motivation profile. Prior research suggests individuals who have low levels of motivation are at risk within the school context (Gottfried et al., 2001). Given the greater freedom within the leisure context, individuals exhibiting low consistent motivation within leisure may be at even greater risk. A second group to target may be the high consistent motivation profile members who end up moving to the low consistent motivation profile. By better understanding these typologies and their correlates we can hand-pick individuals at greater risk for negative outcomes. The next methodological steps

include conducting a latent profile analysis to better account for uncertainty in latent class membership and testing for changes in the type and number of latent classes at each time point in addition to the latent statuses. Although this study represents a first step, future studies will need to expand on this approach and address how shifting contextual factors are associated with leisure motivation. Possible questions to address include: What happens in the moment when amotivation shifts from intrinsic to extrinsic? What influences the return to a state of intrinsic motivation? What causes a person to shift between motivation profiles over time? Do profiles comprise many motivations experienced in one activity or one motivation experienced across many activities?

Furthermore, intervention effects were limited to girls in one school with teachers who apparently taught the intervention material at a higher level than teachers in the other three intervention schools. These findings suggest further attention should be given to why girls were more affected by the content than boys. Further attention also needs to be given to the quality of program delivery.

Despite these limitations and need for future research, findings from this study suggest a person-centered approach to leisure motivation using SDT is a viable method for dealing with the complex topic of leisure motivation. From a health promotion perspective, this is important because of the association between leisure motivation and substance use. Results inform future interventions that address leisure motivation as a means to reduce substance use.

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## Disclosure statement

None of the authors have any conflicts of interest to report.

## Disclaimer

The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. The National Institute on Drug Abuse was not directly involved in study design, data collection, analyses, interpretation, or manuscript preparation.

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