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Work and Non-Work Physical Activity Predict Real-Time Smoking Level and Urges in Young Adults

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Abstract

Introduction: Physical activity (PA) and smoking are inversely related. However, evidence suggests that some types of PA, namely work-related PA, may show an opposite effect. Despite growing knowledge, there remains a paucity of studies examining the context of these behaviors in naturalistic settings or in young adults, a high-risk group for escalation.

Methods: Participants were 188 young adults (mean age = 21.32; 53.2% female; 91% current smokers) who participated in an electronic diary week to assess daily smoking and urges and a PA recall to examine daily PA. PA was coded into non-work-related and work-related activity to examine differential effects. We considered both participants' weekly average PA and their daily deviations from their average.

Results: Mixed-effects regression models revealed that higher weekly average non-work PA was associated with lower smoking level and urges. Daily deviations in non-work PA did not predict urges; however, increased daily non-work PA relative to participants' weekly average was associated with lower smoking for females but higher levels for males. Regarding work PA, only higher weekly average work PA was associated with higher smoking level for both genders; work PA did not predict urges.

Conclusions: Results extend previous literature by documenting differential associations between non-work and work PA and young adult smoking and suggest that young adults engaged in work PA should be considered a high-risk group for escalation. Findings provide theoretical and clinical implications for the use of PA in intervention and highlight the necessity of considering PA as a multidimensional construct when examining its links to health behavior.

Introduction

Physical Activity and Smoking

Considerable research indicates that physical activity (PA) and smoking are inversely related.[1–3] However, the majority of studies examining this link have been conducted among adults of various ages (i.e., 18+). We have notably less insight into how smoking and PA co-occur specifically in young adults, an age group demonstrating unique risk for smoking progression.[4,5] To better elucidate this

association, researchers have suggested the need for more innovative and methodologically sophisticated studies to understand the context of these behaviors.[1] This study targeted these limitations by combining real-time and recent recall data collection methods to examine the association between PA and smoking in young adults. Specifically, we sought to evaluate the extent to which specific types of PA, namely work-related and non-work-related PA, were associated with daily smoking intensity and urges. Given the increasing use of PA as an aid for smoking cessation among adults,[6,7] and more recently younger populations,[8,9] results of this study have direct implications for intervention.

In addition to the influx of observational research examining PA and smoking behavior, there has also been a surge of laboratory-based studies examining the effects of PA on smoking urges and cravings.[10–14] Extant evidence in adults is robust that a short bout of exercise at a variety of intensities is beneficial for ameliorating desires to smoke. Although contention exists in the literature regarding the clinical significance of urges and their effect on smoking behavior, many studies have highlighted their prognostic value.[15] For example, evidence has revealed that urges to smoke, even outside of a defined quit attempt, can be an important marker of future difficulties quitting.[16] Based on the predominantly laboratory-based paradigms of the PA and urge studies to date, more naturalistic studies are needed to better understand this phenomenon within real-world contexts.[10] Researchers further emphasize the importance of more clearly examining the parameters of PA, including the type of PA,[12] that are beneficial for reducing urges to smoke.[13]

Differentiating PA

PA is broadly considered bodily movements resulting in energy expenditure.[17] Although guidelines do not discriminate between types of PA (e.g., occupational vs. leisure-time),[18] some suggest that there might be important differences in the benefits of different types of activity.[17] In line with that assertion, one study comparing health benefits associated with different PA types revealed that engaging in higher levels of occupational PA was associated with higher smoking and risk factors for coronary heart disease among adult men, whereas leisure-time PA was protective.[19] This finding was replicated in another study of adult men and women, which showed that engaging in greater occupational PA was associated with increased smoking and other negative health behaviors, including higher fat intake.[20] Fransson and colleagues further found some adverse effects of household and occupational PA on select cardiovascular risk factors not observed in leisure-time PA. Despite evidence for the differential effects of various PA types on health, the manner in which types of PA predict smoking in younger populations is far less understood.

The Current Study

The current study combined a 7-day PA recall (PAR)[21] to assess PA with ecological momentary assessment (EMA)[22] to assess smoking level and urges in a sample of young adults enriched for previous smoking behavior. These methods yielded outcomes of daily and weekly work PA and non-work PA, smoking level, and urges to smoke. We aimed to evaluate how both overall weekly average level and individual daily variations of non-work and work PA predicted smoking level and urges.

Consistent with extant literature[1,10–12] that largely evaluates leisure-time PA, we predicted that higher overall levels of non-work PA averaged over the week, as well as daily increases in non-work PA (relative to individuals' weekly average level) would each be associated with lower smoking level and urges. In contrast, based on limited evidence suggesting that occupational PA is associated with increased smoking,[19,20] we predicted that higher weekly average work PA and higher daily work PA relative to an individual's weekly average level would each be related to higher smoking level and urges. Although some gender differences in the PA and smoking link have emerged in this literature,[8] most evidence is weak and inconsistent;[1] thus, we included exploratory gender analyses.

Methods

Overview of Design, Participant Recruitment, and Description

Data for this study come from the 5-year assessment wave (collected from March of 2011, through February of 2012) of a large longitudinal study investigating the social and emotional context of adolescent and young adult smoking patterns. See Richmond, Wakschlag, and Mermelstein[23] for more details on initial participant recruitment.

Participants (N = 188) for the present study were a subset of young adults who participated in the project's 5-year EMA study (61.2% of 5-year EMA participants), as the PAR was added partway into the 5-year assessment. This sample represents those who completed both the 5-year PAR and EMA study with complete data of all primary and control variables. Participants were recruited into the 5-year EMA sample from the larger study cohort (N = 1,092 at the 4-year wave; 86.4% of baseline participants) based on smoking during earlier EMA waves and self-reported smoking on the 4-year self-report questionnaire (i.e., any past month smoking). For those not participating in prior EMA waves, self-reported smoking in the past month at 4 years determined eligibility. See Table 1 for sample characteristics. There were no significant differences between the current sample and others in the overall 5-year EMA study in terms of demographic characteristics or self-reported smoking; however, those not included had a marginally higher body mass index (BMI; M= 26.15, SD= 5.96) compared to participants, $t(188) = 1.82$, $p = .071$ (Cohen's $d = 0.22$).

Procedures

Three methods of data collection were used for the present study: (a) self-report questionnaire to assess demographic variables, BMI, and descriptive smoking information; (b) EMA to evaluate smoking level and urges; and (c) 7-day PAR to evaluate PA.

Self-Report Questionnaires

Questionnaires were mailed to participants and packets were brought to EMA training or completed in-person at the training.

EMA

All participants received training on the use of the EMA device (hand-held computer) at the beginning of the data collection week and carried it for seven consecutive days. Throughout the week, the device randomly prompted participants five to seven times throughout the day to answer questions about their mood, feelings about smoking, behavior, and situation "right now." Participants were also trained to event-record "smoke" interviews following cigarette smoking. Each entry was date- and time-stamped.

PAR

When participants were debriefed at the end of the EMA week, trained staff completed the 7-day PAR to assess PA of at least participant-defined moderate intensity throughout the days corresponding to the EMA data collection. All interviewers were trained on a protocol adapted from Sallis et al.[21] Participants were asked to provide the name and duration of each activity as well as their own assessment of intensity using established guidelines. The purpose of the PAR instrument to measure PA, as opposed to using the electronic diary for PA data collection, was to reduce participant burden and aid in the collection of potentially richer descriptive data through the use of an interviewer-led paradigm. For the majority of participants (n = 156; 83%), six full days of usable data were obtained (i.e., days 2 through 7). Day 1 on the PAR coincided with the EMA training day, which took place at various times throughout the day and thus often did not contain a full day of usable data. Some participants (n = 32; 17%) had fewer days of data either because they carried the diary for fewer days, EMA data was not collected on certain days of the week, or interviewer error on the PAR.

Table 1. Sample Characteristics

	M	*SD*	% Total
Age	21.32	0.77	
Days smoked—last month	19.16	11.73	
Cigarettes smoked/day—last month	5.81	5.43	
Body mass index	25.00	4.28	
Gender			
Male			46.8
Female			53.2
Race/ethnicity			
White			61.7
Black			13.3
Hispanic			16.5
Asian/Pacific islander			4.3
Other/unknown			4.3
Current educational status			
Not enrolled			39.4
High school/working on GED			1.1
Vocational/technical school			2.7
2-year college			21.8
4-year college			33.0
Graduate school			1.6
Unknown			0.5
Current employment status			
Not working			25.0
Working part-time			47.9
Working full-time			26.6
Unknown			0.5

Note. GED = general education development; N = 188. All information reported is based on self-report questionnaire data. Values within category may not add up to exactly 100% due to rounding.

Measures

Demographic Information

Demographic information was assessed via questionnaire and included age, gender, race/ethnicity, educational status, and employment status.

Smoking Level

Smoking level was assessed using EMA reports of daily smoke interviews. During each interview, participants reported on the amount just smoked: "less than one cigarette," "one cigarette," or "more than one cigarette." The amount was recoded, such that less than one cigarette and one cigarette were each counted as one and more than one cigarette was counted as two. Given that participants were trained to event-record smoking after each cigarette, reports of more than one cigarette per interview were rare. The number of cigarettes was summed for each day. Days without smoke interviews that had corresponding random prompt data were considered to have had zero cigarettes smoked. This variable was highly skewed and thus was transformed into three levels representing total daily cigarette use: no cigarettes (coded as 0), one cigarette (coded as 1), and more than one cigarette (coded as 2). See Table 2 for descriptive statistics of main study variables.

Urges to Smoke

Urges were assessed by one item on each random EMA interview asking participants to rate their current "urge for a cigarette" on a 10-point Likert-type scale, from 1 (not at all) through 10 (very much). A daily urge score was calculated to represent the mean of responses throughout the day.

Self-Reported Smoking

Self-reported smoking was assessed via questionnaire. Participants reported the number of days on which they smoked cigarettes in the

Table 2. Descriptive Statistics of Main Study Variables

	N(n)	*M*	*SD*	Number of days (% total)
Physical activity variables				
Weekly average (BS) non-work physical activity	188	0.53	0.32	
Daily deviation (WS) in non-work physical activity	188(1,069)	0.00	0.38	
Weekly average (BS) work physical activity	188	0.32	0.35	
Daily deviation (WS) in work physical activity	188(1,069)	0.00	0.32	
Smoking variables				
Urges	188(1,069)	4.24	2.77	
Smoking level[a]	188(1,069)			
0				601 (56.2%)
1				191 (17.9%)
2				277 (25.9%)

Note. BS = between-subjects; N = number of participants included; n = number of days included; WS = within-subjects. Daily deviation represents the daily deviation from each participant's weekly average level; Weekly average represents the overall weekly mean for each participant.

[a]Smoking level = number of cigarettes each day; 0 = none; 1 = one; 2 = more than one.

last month and the number of cigarettes smoked each day on days smoked.

PA

PA was assessed using the 7-day PAR, a widely-used, semi-structured interview that estimates PA over the week. It has been shown to have strong psychometric properties,[21] including good concurrent validity compared to daily recall[24] and objective PA assessments.[25] Once data were collected, all activities were coded into the categories of non-work PA and work PA. Non-work PA was considered leisure-time activities (e.g., structured exercise, recreational activities) or transportation activities (e.g., walking, biking). Work PA was considered any activity described by participants as work (e.g., waitressing, janitorial work) or household/caretaking (e.g., cleaning, taking care of children). This division was based on informed hypotheses that leisure-time and transportation PA are more intentional and modifiable for the purposes of intervention. Hours of non-work PA and work PA completed each day were initially summed; however, both variables were highly skewed toward zero. As such, given recent syntheses of data indicating that even very brief PA has positive effects on smoking outcomes,[10,12] days were re-coded for each category into no PA and any PA.

Across males, a total of 390 non-work activities and 172 work activities were reported. Non-work activities for males included the following: walking (47.9%), strength/toning (20.0%), sports (14.4%), running (5.1%), biking (4.1%), dancing (1.8%), and other recreational activities (6.7%). Work activities for males were primarily activities described as related to their occupation (87.2%) and a smaller number were household/caretaking (12.8%).

Females reported a total of 511 non-work activities and 205 work activities. Among females, non-work activities included the following: walking (56.8%), running (8.4%), biking (7.6%), dancing (7.2%), strength/toning (5.9%), sports (2.5%). and other recreational activities (11.5%). Work activities for females were also largely related to their occupation (74.6%) and a smaller number were Household/Caretaking (25.4%).

BMI

BMI was assessed using self-reports of weight and height from questionnaires and calculated as [weight (pounds)/height (inches)^2] × 703.

Results

Analytic Approach

Primary analyses were conducted in two ways in SAS 9.4: (a) mixed-effects ordinal logistic regression with a random subject intercept using the GLIMMIX procedure when examining smoking level and (b) mixed-effects regression for continuous outcomes with a random subject intercept using the MIXED procedure when examining smoking urges. To prepare each variable, a weekly mean of non-work PA and work PA for each subject was calculated from daily, zero or one, values. Each subject's daily non-work PA or work PA was then subtracted from the weekly mean to derive the daily deviation from each subject's own average. The weekly average served as the between-subjects (BS) effect, and the daily deviation served as the within-subjects (WS) effect.[26] Each model separately evaluated the effect of PA on smoking level and urges.

BS PA variables were first mean-centered at the BS level to enhance the interpretability and reduce multicolinearity of the model. WS variables were mean-centered in their creation. Each model was evaluated for gender differences, and significant interactions were probed using techniques outlined by Holmbeck.[27] In cases when both gender interactions with PA were not significant, interactions were dropped, and models were re-analyzed with only main effects. Finally, given evidence documenting that weight status (i.e., BMI—both at the low and high end) has been linked to increased smoking[28] and the strong association between weight status and PA,[29,30] all analyses controlled for BMI (mean-centered). Gender, when not considered as a moderator, also remained in models as a control.

Gender Differences

For descriptive purposes, a series of mixed-effects regression models with random subject intercepts in SAS 9.4 examined gender differences in PA (non-work PA and work PA prior to BS and WS manipulations), smoking level, and urges to smoke (binary logistic, ordinal logistic, and standard, respectively). There were no significant differences (p values ranged from .151 to .918). An independent samples t test examined gender differences in BMI and also revealed no effect, $t(186) = -0.06$, $p = .953$ (Cohen's $d = -0.01$).

Primary Analyses

Non-Work PA

Results revealed significant negative effects of both WS and BS non-work PA on smoking level (Table 3). The WS effect, however, was qualified by an interaction between WS non-work PA and gender. Follow-up analyses of the gender interaction showed a significant negative effect of WS non-work PA on smoking level for females, estimate = −0.647, $p = .015$, such that engaging in higher levels of daily non-work PA relative to participants' average level was associated with lower smoking on a given day. For males, there was a significant positive effect of WS non-work PA on smoking level, estimate = 0.736, $p = .009$, such that engaging in higher levels of daily non-work PA relative to participants' average level was associated with higher levels of smoking on a given day. The BS effect indicated that across all individuals, engaging in more weekly average non-work PA was associated with lower smoking levels.

Results also revealed a significant negative effect of BS non-work PA on urges, but the effect of WS non-work PA was not significant (Table 4). Effects were consistent across males and females, as there were no significant gender interactions predicting urges. Thus, for all participants, engaging in more weekly average non-work PA was associated with lower smoking urges, but daily deviations in non-work PA relative to participants' average level were not predictive of daily urges.

Work PA

Results revealed a significant positive effect of BS work PA on smoking level, indicating that engaging in higher levels of weekly average work PA was associated with higher levels of smoking (Table 3). The WS effect of work PA on smoking level was not significant. In other words, over the course of the week, engaging in more work PA was associated with more smoking, but daily deviations in work PA relative to participants' average level were not associated with daily fluctuations in smoking level. Effects did not vary as a function of gender.

Results showed no significant effect of either WS work PA or BS work PA on smoking urges (Table 4). Further, there were no significant interactions with gender in predicting urges. Thus, neither weekly average work PA nor daily deviations in work PA relative to participants' average level were predictive of smoking urges.

Table 3. Mixed-Effects Ordinal Logistic Regression Models of Non-Work and Work PA Predicting Smoking Level

Non-work PA model	*df*	Estimate	*SE*	*t* value	*p* value
Intercept 2	184	−1.939	0.277	−7.00	<.001
Intercept 1	184	−0.506	0.267	−1.89	.060
Gender	877	0.109	0.382	0.28	.776
BMI	877	0.032	0.044	0.71	.476
Daily deviation (WS) in non-work PA	877	−0.647	0.264	−2.45	.015
Weekly average (BS) non-work PA	877	−1.966	0.840	−2.34	.020
Daily deviation (WS) in non-work PA × gender	877	1.383	0.386	3.58	<.001
Weekly average (BS) non-work PA × gender	877	0.611	1.195	0.51	.609
Work PA model	***df***	**Estimate**	***SE***	***t* value**	***p* value**
Intercept 2	184	−1.935	0.274	−7.06	<.001
Intercept 1	184	−0.521	0.264	−1.97	.050
Gender	879	0.144	0.378	0.38	.704
BMI	879	0.024	0.044	0.56	.579
Daily deviation (WS) in work PA	879	0.127	0.227	0.56	.576
Weekly average (BS) work PA	879	1.268	0.544	2.33	.020

Note. BMI = body mass index; BS = between-subjects; PA = physical activity; WS = within-subjects. Daily deviation represents the daily deviation from each participant's weekly average level; Weekly average represents the overall weekly mean for each participant. N = 188; n (number of days) = 1,069; gender coded as 0 = female, 1 = male.

Table 4. Mixed-Effects Regression Models of Non-Work and Work PA Predicting Urges to Smoke

Non-work PA model	*df*	Estimate	*SE*	*t* value	*p* value
Intercept	184	4.043	0.245	16.52	<.001
Gender	880	0.456	0.359	1.27	.204
BMI	880	0.040	0.042	0.95	.342
Daily deviation (WS) in non-work PA	880	0.013	0.099	0.13	.899
Weekly average (BS) non-work PA	880	−1.615	0.556	−2.90	.004
Work PA model	***df***	**Estimate**	***SE***	***t* value**	***p* value**
Intercept	184	4.007	0.250	16.06	<.001
Gender	880	0.525	0.365	1.44	.151
BMI	880	0.033	0.043	0.77	.439
Daily deviation (WS) in work PA	880	0.037	0.120	0.31	.755
Weekly average (BS) work PA	880	0.361	0.525	0.69	.493

Note. BMI = body mass index; BS = between-subjects; PA = physical activity; WS = within-subjects. Daily deviation represents the daily deviation from each participant's weekly average level; Weekly average represents the overall weekly mean for each participant. *N* = 188; *n* (number of days) = 1,069; gender coded as 0 = female, 1 = male.

Discussion

Overview

The current study examined the association between PA—obtained through a recent recall—and real-time reports of cigarette smoking and urges to smoke in a sample of young adults with intermittent and low levels of cigarette smoking. Findings highlight the complexity of the link between PA and smoking in that effects varied by the type of PA, gender, and smoking outcome examined. Results provide evidence for the necessity of more clearly differentiating the context in which PA occurs when evaluating its function as a tool for smoking reduction in young adults.

Non-Work PA

Consistent with predictions, engaging in more overall, weekly average, non-work PA was associated with lower smoking levels and urges for both females and males. This finding is notable for urges, in particular, given that the majority of studies revealing benefits of PA for urge reduction, both as a whole[10–12] and in young adults specifically,[14] have examined only acute effects within the context of abstinence and a laboratory setting. Our results largely corroborate extant literature on the benefits of non-work PA (e.g., leisure-time PA) on smoking intensity and urges[1,10–12] but extend it by documenting naturalistic effects specifically within a young adult sample of mostly light and intermittent smokers.

At the daily level, however, engaging in greater daily non-work PA relative to the individual's weekly average was associated with lower levels of smoking for females but higher levels for males. Thus for females, not only are those engaging in more weekly average non-work PA smoking less, but they are also generally smoking less for themselves on a given day if they are engaging in non-work PA on that day. Although current methodology precludes us from establishing that PA caused smoking reduction, such an intraindividual association promotes non-work PA as an accessible tool for reducing smoking in young adult females. Although the WS, daily deviation,

effect for males is contrary to predictions, explanations can be posited. For example, cognitive reframing and rationalizations may come into play to explain this finding. That is, active males may believe that they "earn" a cigarette through engaging in PA on a given day, resulting in increased smoking, despite generally low smoking levels. Such thinking may be even more likely among young adults, who have been shown to discount or underestimate the risks associated with even minimal smoking.[31] A more detailed assessment of the association between various types of non-work PA (i.e., strength training/toning vs. running) and smoking outcomes might further elucidate the gender effect but is outside the scope of the current study.

In contrast to predictions, there was no WS, daily deviation, effect of non-work PA on urges. Particularly given the effect observed of daily deviation in non-work PA on smoking level, it is possible that the way in which urges were operationalized as a daily average might impede the ability to detect the very proximal benefits (e.g., from 5 to 30 min) observed in many studies.[10] It is also important to recall that the WS variable reflects variability, and several individuals exhibited no deviation in PA throughout the week either at the low (i.e., no PA) or high end (i.e., daily PA). Although not feasible in this study, future research in this domain should consider more closely evaluating the time sequence of PA and smoking urges.

In sum, non-work PA benefits to smoking level and urges were largely observed at the overall, weekly average level. Although cross-sectional, results may indicate that the aggregation of PA, perhaps through more habitual engagement, is most beneficial for behavior change in smoking and sustained reduction among young adults.

Work PA

Consistent with hypotheses, higher weekly average work PA was associated with higher smoking levels. Daily deviations in work PA did not significantly predict smoking level, and work PA did not predict urges either at the weekly average level (BS) or when examining daily deviations (WS). Although there is a paucity of literature dedicated to this topic, particularly in young adults, results converge with past findings showing links between higher occupational PA and increased smoking intensity in broader adult samples.[19,20] Although work PA was not associated with urges to smoke, the act of smoking more often may have satiated urges for many engaged in high levels of work PA.

Despite the fact that both non-work PA and work PA often show similar direct health-related benefits,[32] even among smokers,[33] results suggest that indirect associations with PA are highly context dependent. For example, reasons for engaging in PA might play an important role in associated outcomes. Common reasons that young adults engage in non-work PA, exercise in particular, are to attain positive health outcomes, avoid negative health problems, and to improve appearance,[34] goals that typically oppose smoking. Work PA, both occupational and household, in contrast, is imposed by others or completed out of necessity, and is likely not a reflection of one's motivation for good physical health or appearance. Other researchers[20] similarly posited that the voluntary nature of leisure-time versus largely involuntary nature of occupational/household PA might play a notable role in their differential effects on health outcomes.

The mood boost accompanying PA has also been frequently suggested as a possible explanation for the PA and smoking link,[1,10] but nuances exist in this pathway that may come into play. Although it is well-established that naturally-occurring PA is largely associated with improved acute mood states[35–37] and better overall emotional functioning, such as lower depressive symptoms,[38,39] there are some contexts in which this effect has not been observed. For example, one study showed that engaging in higher levels of occupational PA was associated with worse depressive outcomes among adult women.[40] Given the relation between both higher negative mood and lower positive mood to increased smoking,[41] the mood benefits or detriments from these various activities might be one rationale for their differential effect on smoking. Together, this evidence indicates that considering PA as a unitary construct within the context of smoking may not be justified.

Although past findings regarding work PA and its link to increased smoking might be a function of socioeconomic status,[19,42] this may not be the case in young adults who may take active jobs as temporary positions rather than longer-term careers. This transient theory may hold true in this sample, as educational status (i.e., both current and highest level attained—a similar proxy used in past studies) did not alter results when considered in the models (results not shown). It should be emphasized that we are not suggesting that work PA is "bad." Rather, results indicate that the type of PA matters when examining its links to health behavior. In this case, for example, young adults engaging in higher levels of occupational and/or household PA might be a group at increased risk for escalation and important, likely overlooked, targets for intervention.

Conclusions, Limitations, and Future Directions

This study had several strengths, including its innovative approach and translational implications. However, limitations should not go unnoted. First, self-report data is inherently biased, and it is not uncommon for individuals to over- or under-estimate the amount of daily PA performed.[43] In part, such error was attenuated by examining PA as a dichotomous variable on a daily basis. Nonetheless, future research should consider combining objective and qualitative methods to enhance the accuracy of reporting while still incorporating rich descriptive data. The second limitation is the inability to disentangle temporal precedence between PA and smoking, eliminating the ability to make conclusions regarding causation. Finally, the nature of the sample is both a strength and limitation. As is increasingly characteristic of young adult smokers,[44,45] our sample was largely non-daily and light smokers. Although nearly all participants (91%) reported smoking in the past month, only 70 (37.2%) smoked daily. For smokers, the average daily smoking rate was 6.4 cigarettes. Thus, our sample may well be characteristic of young adult smokers today. A limitation, though, is that we did not have a high proportion of daily smokers, for whom cessation programming is often targeted.

Results extend existing knowledge in the link between PA and smoking by revealing specific contexts in which these associations exist in terms of the type of PA (i.e., non-work vs. work), how it is measured (i.e., weekly average level vs. daily variations within an individual), outcome evaluated (i.e., smoking level vs. urges), and gender. This highlights the need for more tailored approaches not previously considered in young adults, for example, considering the level of work PA as a marker of risk for continued smoking and escalation.

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Declaration of Interests

None declared.

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