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Physical activity context and university students propensity to meet the Centers for Disease Control and Prevention/American College of Sports Medicine Guidelines

Shauna M. Burke
Western University

Albert V. Carron
University of Western Ontario

Mark Eys
Wilfrid Laurier University, meys@wlu.ca

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Shauna M. Burke[ABCDEF], **Albert V. Carron**[ACDEF], **Mark A. Eys**[ACDE]

The University of Western Ontario, London, ON, Canada

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Summary

Background: Previous research shows that exercise context is important for exercise adherence – exercising alone is associated with reduced adherence whereas exercising with others is associated with increased adherence. The purpose of the study was to examine whether exercising in one or a combination of four contexts for physical activity (in a structured class, with others outside of a structured class, alone but in an exercise setting, and completely alone) is related to the degree to which university students meet prescribed (i.e., CDC/ACSM) guidelines for aerobic activity.

Material/Methods: Males (n=196) and females (n=398) completed a self-reported physical activity questionnaire pertaining to the frequency, intensity and duration of their activity in the four contexts outlined above.

Results: A positive relationship was found between the percentage of students meeting CDC/ACSM Guidelines and the number of contexts in which physical activity was undertaken. That is, a small percentage (9.9%) were active in a single context (i.e., only one context out of a possible four), with the majority of those (5.9%) engaging in physical activity with others outside of a structured setting. A larger percentage (28.9%) were active in two contexts, while 61.2% were active in three or more contexts.

Conclusions: Health care professionals interested in motivating the physically inactive to become more active and the physically active to maintain activity at a frequency, intensity, and duration sufficient to meet the CDC/ACSM guidelines ought to promote opportunities for physical activity in a variety of social contexts.

key words: **exercise • aerobic • health • exercise frequency**

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Author's address: Shauna M. Burke, School of Kinesiology, The University of Western Ontario, London, Ontario, N6A 3K7, Canada, e-mail: sburke7@uwo.ca

BACKGROUND

In 1995, a panel of 20 scholars representing the Centers for Disease Control and Prevention and the American College of Sports Medicine reviewed physiological, epidemiological, and clinical data associated with involvement in physical activity [1]. Noting that there is compelling evidence supporting a link between physical activity and physical and psychological health and mortality, the panel proposed a revised set of guidelines for physical activity (that are hereafter referred to as the CDC/ACSM Guidelines). The CDC/ACSM Guidelines comprised the recommendation that adults should accumulate "30 minutes or more of moderate-intensity physical activity on most, preferably all days of the week" in order to obtain the health benefits of physical activity [1].

Subsequent to the publication of the CDC/ACSM Guidelines, considerable interest has been directed toward determining the degree to which various populations are sufficiently active to achieve the health benefits of exercise [2]. One such population that has been a focus (because of its numbers and future potential impact on society) has been university students; i.e., 9.4 million young adults in the United States [3] and 25% of Canadians between the ages of 18 and 24 attend university [4,5].

Although there has been a relatively large amount of research on university/college students [6], the operationalization of physical activity has varied widely. However, five studies have used the CDC/ACSM operational definition for physical activity [2,7–10]. The percentage of students found to be insufficiently active varied from 36% [9] to 65.9% [2]. The average across the five studies was 51.3%. On the basis of their results, Martin et al. urged that "interventions must be directed toward … [physical activity level], individual characteristics and the determinants, and barriers that have the greatest potential for effectively changing physical activity lifestyle behaviors" [2].

If interventions are to be implemented, a question of fundamental concern is which *context* for carrying out that physical activity ought to be emphasized. Iverson, Fielding, Crow and Christenson pointed out that the most common contexts for physical activity are either in a *group* or *alone* [11]. The former can take many forms such as, for example, attendance at a structured exercise class, physical activity in the company of family, friends, and/or associates with a similar malady, and so on. Similarly, the latter can take many forms including, for example, home-based physical activity programs, solitary jogging, independent activity carried out at fitness facilities, and so on.

One consideration that bears upon the issue of which context ought to be emphasized is individual preferences. In fact, researchers have suggested that physical activity interventions have the most potential for success when they are tailored to individual preferences [12,13]. When older adult exercisers were asked by Mills, Stewart, Sepsis, and King, what was more appealing, exercising alone or exercising in an organized group/class with a leader, 34% reported that exercising alone was more appealing while 28% preferred the group setting and 39% endorsed both equally [14]. Also, Wilcox, King, Brassington, and Ahn found support for exercising alone versus a class-based setting in both middle aged (69% versus 31% respectively) and older adults (67% versus 33% respectively) [13].

In contrast, however, Burke, Carron, and Eys found that when university students were asked which of four physical activity contexts (i.e., structured classes, with others outside of structured classes, alone but in the company of others, and completely alone) was most preferred, exercising with others outside of a structured class was endorsed by the largest number of males and females for both aerobic activities and weight training. The context identified by the largest number of participants as least preferred varied by gender but was consistent across the two activity types. That is, the largest number of females rated being completely alone as least preferable for both aerobic activity and weight training while the largest number of males identified structured classes as least preferable for the two types of activities [15].

A second consideration that bears upon the issue of which context ought to be emphasized is adherence behavior. Here the results are unequivocal. In a meta-analysis that examined the impact of social presence on adherence (87 studies with 49,948 participants), Carron, Hausenblas, and Mack found that exercising with others present (versus exercising alone) had a small to moderate effect on adherence behavior (effect size =0.32) and that the effect increased to moderate to large (effect size =0.62) when the individuals exercised in task cohesive groups [16]. In another meta analysis that examined the effectiveness of various interventions (127 studies with 131,156 participants), Dishman and Buckworth reported that interventions delivered to groups (i.e., in a group or class-based setting) produced much larger effects (r=0.75) in comparison to interventions delivered to individuals (i.e., one-on-one; r=0.16), to the family (r=0.05), and to individuals within a group (i.e., individual attention plus group activities; r=0.04) [17].

There is a third consideration that bears on the issue of which context ought to be emphasized. That consideration relates to whether exercising in the presence of others (i.e., in a structured class, with others outside of a structured class, or one one's own in the presence of others) is superior to exercising completely alone (e.g., jogging alone outdoors or weight training alone at home) in terms of the likelihood that the participant will meet the proposed CDC/ACSM Guidelines considered necessary to obtain the health benefits of physical activity. The hypothesis that seems most tenable is that exercising in the company of others would be strongly related to the propensity of exercisers to meet the CDC/ACSM Guidelines. As a corollary, another hypothesis that also seems tenable is that exercising completely alone would be minimally related to the propensity to meet the CDC/ACSM Guidelines.

In addition to the evidence presented above regarding the more positive effect of exercising in a group environment (versus exercising alone) on adherence, another basis for these hypotheses is a substantial body of research on the effect of the presence of others. Research under the rubric of social facilitation [18] has shown that when participants are engaged in simple, well-learned tasks, the presence of others increases/enhances performance (see Carron,

Burke, & Prapavessis for an overview) [19]. Also, research under the rubric of self-presentation [20] has shown that presence of others stimulates the desire to make a favorable impression (see Hausenblas, Brewer, & Van Raalte for an overview) [21].

The general purpose of the present study was to examine whether exercising in one or a combination of four contexts for physical activity (exercising in a structured class, exercising with others outside of a structured class setting, exercising alone but in an exercise setting, and exercising completely alone) has an effect on the propensity for male and female university students to meet the CDC/ACSM Guidelines for aerobic physical activity. Specifically, participants were asked whether they engaged in physical activity in each of the four contexts and then, in the event of a positive response, asked to indicate (a) the number of times per week they exercised, (b) the number of minutes per session, and (c) their typical intensity.

For participants who engage in a *single* physical activity context, it was hypothesized that in decreasing order, the most favorable contexts for meeting CDC/ACSM Guidelines would be exercising with others outside of a structured class setting, exercising with others in a structured class setting, exercising alone but in the company of others, and finally, exercising completely alone. Support for this hypothesis was derived from the literature discussed above. That is, the presence of others has a beneficial impact on adherence and produces enhanced performance [16–18,20]. Therefore, it seemed probable that the contexts associated with the presence of others would be associated with a greater likelihood that the CDC/ACSM Guidelines would be achieved. Support for the hypothesis that exercising with others outside of a structured class setting would be superior to the other contexts in which others are present (i.e., exercising with others in a structured class setting and exercising alone but in the presence of others) came from the work of Burke et al. who found that university students have the strongest preference for exercise with others outside of a structured class setting [15].

It was also hypothesized that in comparison to participants who exercise in a single context only, participants who exercise in *multiple* (i.e., 2 or more) contexts would be more likely to meet the CDC/ACSM Guidelines. Support for this hypothesis came in part from the field of industrial psychology, where researchers have demonstrated the importance of variety in work settings for outcomes such as job satisfaction and work effectiveness [22]. Additional rationale stemmed from the fact that realistically, most individuals probably do not adhere to only one physical activity context, and it is also easier to obtain the recommended amount of physical activity when it is totaled across a variety of contexts and/or settings.

Material and Methods

Participants and procedures

Participants were a convenient sample of first and second-year Kinesiology undergraduate students who completed a questionnaire as part of a laboratory experience for course credit. The university's Research Ethics Board required that approximately three weeks after the questionnaires were submitted to the instructor, students complete a consent form providing their permission to use the data for research purposes. Signed consent forms were placed in a sealed dropbox (in the absence of the course instructor and the investigators) and were not scrutinized until after the final grades for the course had been submitted.

On the consent forms, the students were informed that their agreement (to permit the investigators to use their responses) was voluntary, all personal responses would be kept confidential, only group responses would be reported, and only the responses of students who signed the consent form would be included in the study. Both the protocol and questionnaire were submitted to and approved by the Office of Research Ethics within the university.

Of the 638 students enrolled in the course, 9 did not hand in the questionnaires, 28 subsequently did not sign a consent form, and 7 sets of responses were unusable. Thus, the responses of 594 students (196 males, mean age =19.75, *SD*=1.35 yrs. and 398 females, mean age =19.35, *SD*=1.18 yrs.) provided usable data. It should be noted that the university from which the sample was recruited consists of a largely Caucasian population, with students from predominantly middle- and upper-socioeconomic status backgrounds.

Measures

Initially, a series of demographic factors were assessed. These included age, gender, weight, and height.

Self-reported physical activity. Four identical sections were provided to the participants to determine the extent to which the students were physically active – one for each of the contexts of (a) structured aerobics classes, (b) with others outside of a structured aerobics class, (c) alone in an exercise setting, and (d) completely alone. The format in those four sections was identical (a structured class setting is used here to illustrate the format). Initially, participants were asked:

"Do you participate in structured aerobics classes (e.g., aerobics classes at a fitness center)?" Two response options were provided: yes or no.

Participants were then informed that if they answered yes, they should fill out the next three questions; if they answered no, they should proceed to the next section in the questionnaire. If participants answered yes, they then responded to a question relating to *frequency*: "How many times per week do you attend these aerobics classes?" Five response options were provided: (a) less than 1 time/week (i.e., once, twice, or three times/month), (b) 1–2 times per week, (c) 3–4 times per week, (d) 5–6 times /week, (e) 7 or more times/week.

Following the question about frequency of exercise, participants responded to a question relating to *duration*: "How many minutes per class do you typically exercise in these aerobics classes?" Four response options were provided: (a) 30 minutes or less, (b) 31–45 minutes, (c) 46–60 minutes, and (d) 61 minutes or greater.

Table 1. The contexts in which university students meet the Centers for Disease Control and Prevention/American College of Sports Medicine recommendations for physical activity.

Context for Physical Activity	Total (*n*=253)	Females (*n*=192)	Males (*n*=61)
One context only			
In Structured Aerobics Classes (I)	0.4%	0.5%	0
With Others Outside a Structured Class Setting (II)	5.9%	4.7%	9.8%
Alone in an Exercise Setting (III)	2.0%	1.0%	4.9%
Completely Alone (IV)	1.6%	0	6.6%
Total for a Single Context	9.9%	6.3%	21.3%
Two contexts			
Contexts I and II	2.4%	3.1%	0
Contexts I and III	3.2%	4.2%	0
Contexts I and IV	1.2%	1.6%	0
Contexts II and III	9.5%	7.3%	16.4%
Contexts II and IV	9.9%	5.2%	24.6%
Contexts III and IV	2.8%	2.6%	3.3%
Total for Two Contexts	28.9%	24.0%	44.3%
Three or more contexts	61.2%	69.7%	34.4%

Finally, the participants were queried about the *intensity* of their exercise with the following question: "At what intensity do you typically engage in these aerobics classes?" Five response options were provided: (a) very light, (b) fairly light, (c) somewhat hard, (d) hard, and (e) very hard.

Results

Overall

A total of 34 participants (5.7% of the sample) reported that they were not involved in physical activity in any of the contexts listed. Among the active students, the range of responses to the frequency of physical activity question varied from 0.5 days per week (*n*=10 participants; 1.8% of the sample) to 7 days per week (*n*=163 participants; 29.1% of the sample). The average frequency for active students was 4.65±2.03 days per week. Among the active students, the range of responses to the duration of physical activity question varied from 20 minutes per session (*n*=57 participants; 10.2% of the sample) to 149 minutes per session (*n*=1 participant; 0.2% of the sample). The average duration among active students was 51.80±21.04 minutes per session. Finally, the intensity of exercise among the active students varied from very light (*n*=2 participants; 0.4% of the sample) to very hard (*n*=15 participants; 2.7% of the sample. On average, the active participants exercised at an intensity between somewhat hard and hard.

The CDC/ACSM Guidelines mandate specific concurrent levels for all three criteria, of course. Within the total sample, 42.6% of the participants met the CDC/ACSM Guidelines for exercise frequency, intensity, and duration. There were gender differences, however; 31.1% of the male sample versus 48.2% of the female sample met the guidelines.

Context and physical activity

Table 1 provides an overview of the percentage of students meeting the CDC/ACSM Guidelines who reported involvement in physical activity in various contexts. As Table 1 shows, only a small percentage of students (overall =9.9%) who meet the CDC/ACSM criteria are physically active in only a single context. It is apparent that if a single context is chosen for physical activity, university students are more likely to meet the guidelines if they are exercising with others outside of a structured class setting (overall =5.9%). Thus, there is support for our hypothesis.

What the data in Table 1 also highlight is that the CDC/ACSM Guidelines are most likely to be met when physical activity is performed in a variety of contexts, which also supports our hypotheses. Compared to the percentage of students who exercise in a single context, almost three times as many obtain their physical activity in at least two contexts (overall =28.9%), with the overwhelming majority carrying out activity in three or more contexts (overall =61.2%).

If relatively inactive individuals (i.e., physically active but fail to meet CDC/ACSM Guidelines) and sufficiently active individuals (i.e., meet CDC/ACSM Guidelines) do not differ in the degree to which they utilize the four contexts for physical activity, then context is not an important consideration. Therefore, a second analysis was undertaken that focused on the physical activity contexts used by individuals who were active but failed to meet the CDC/ACSM guide-

lines (=307). Chi square analyses showed that in relation to individuals who met the CDC/ACSM Guidelines, a significantly ($p<0.01$) larger percentage of individuals not sufficiently active exercised in only one context (30.6% versus 9.9%) and a significantly ($p<0.01$) smaller percentage exercised in three or more contexts (32.9% versus 61.2%).

Discussion

The purpose of the study was to examine whether exercising in one or a combination of four contexts for physical activity (exercising in a structured class, exercising with others outside of a structured class setting, exercising alone but in an exercise setting, and exercising completely alone) has an effect on the propensity for male and female university students to meet the CDC/ACSM Guidelines for aerobic physical activity. Two sets of results associated with the purpose warrant highlighting:

One set is that among the students that met the CDC/ACSM Guidelines, only a small percentage (9.9%) was active in a single context (i.e., only one context out of a possible four). Among those who were active in a single context, the majority (5.9%) engaged in physical activity with others outside of a structured setting. This finding was consistent with our hypothesis as well as with previous research that has shown that the most preferred physical activity context for university students is with other people outside of a structured class [15].

A second somewhat related set of results that warrant highlighting is that there was a positive relationship between the percentage of students meeting the CDC/ACSM Guidelines and the number of contexts in which physical activity was undertaken. As indicated above, 9.9% of the students who met the CDC/ACSM Guidelines did so in a single context; 28.9% who did so were active in two contexts, and 61.2% were active in three or more contexts. Our results are consistent with the findings of Glaros and Janelle [23]. These researchers found that participants who experienced a variable aerobic exercise program (in which the type of aerobic exercise was changed every 2 weeks) had superior adherence to an 8-week exercise program as compared to participants who were permitted to choose what type of aerobic exercise they preferred for the duration of the program.

These two sets of findings offer possible prescriptions and challenges to health professionals. Insofar as the former is concerned, health care professionals interested in inducing the physically inactive college student to become more active and the physically active to maintain their activity levels should offer opportunities in a variety of social contexts. Previous research has shown that greater access to physical activity resources such as fitness facilities is related to increased physical activity behavior [24]. Therefore, in addition to focusing on the physical resources available to individuals, it is important for health professionals to emphasize the benefits of exercising in various *social contexts* (i.e., walking alone or with a friend, attending a group exercise class), particularly for those individuals who have limited access to physical activity resources. As noted above, in industrial psychology, factors such as intrinsic motivation, job satisfaction, and work effectiveness are linked to the degree to which variety is present [22]. Our results showed that work output – the frequency, duration, and intensity of physical activity – was also related to variety in context.

Insofar as the challenges are concerned, however, health professionals may have to "sell the advantages" of some physical activity contexts. Individual preferences are positively related to both intentions to exercise and exercise behavior [25]. Further, certain segments of the population have a clear preference for specific contexts. For example, as was pointed out in the introduction, older adult exercisers have indicated a preference for exercising alone [13]. As was also mentioned above, research has demonstrated that exercising with others present is superior to exercising alone for adherence behavior, and interventions delivered in a group or class-based setting were vastly superior to interventions delivered in any other context [16,17].

We are aware that the present findings are somewhat limited in that they generalize specifically to first and second-year Kinesiology undergraduate students. Additional research is needed in order to determine if the present results are representative of the general population.

Health professionals should be sensitive to individual preferences in the early stages of an intervention. However, as participants become more experienced, health professionals should encourage involvement in a variety of different activity types (e.g., walking, swimming, weight training, etc.), across a variety of physical activity contexts (e.g., structured classes, with others outside of structured classes, etc.) in order to increase the probability that individuals will reach the CDC/ACSM Guidelines in the future.

In addition to the two sets of results just discussed, we were also interested in examining the data pertaining to the *percentage* and *type* (i.e., gender) of university students that did/did not meet the CDC/ACSM Guidelines for physical activity. A qualifying note is important here. Our primary purpose was to examine physical activity context in relation to university students' propensity to meet the CDC/ACSM Guidelines. Thus, we were not directly interested in determining the absolute percentage of students who met those guidelines. As a consequence, we did not query participants about their sport participation or physical activities associated with daily living (e.g., gardening, walking to school, etc.). Thus, a larger percentage of our sample might have met the CDC/ACSM Guidelines if we had asked about other forms of physical activity such as sport involvement or activities of daily living.

Bearing this caveat in mind, from a percentage perspective we found that over half (57.4%) of the university students in the present sample did not meet the CDC/ACSM Guidelines for physical activity. Our results are in line with previous research showing that on average, 51.3% of university/college students fail to meet the CDC/ACSM Guidelines [2,7–10]. Nonetheless, our results were unexpected given that the participants in our sample were Kinesiology students who are required (by the participating university) to participate in several sport and exercise-related activities.

From a gender perspective, we found that 68.9% of the male sample did not meet the guidelines whereas a smaller percentage of females (51.8%) did not meet the guidelines.

Typically, research has shown that females are less physically active than males [1,26]. One possible reason for the discrepancy between our results and previous research is the fact that, again, additional forms of physical activity were not considered for the purpose of the present study.

CONCLUSIONS

As we have noted in the discussion above, individuals differ in their *preferences* for type of physical activity context, physical activity context is related to *adherence behavior*, and, finally, physical activity context is associated with the propensity for Kinesiology undergraduate students to meet the *CDC/ACSM Guidelines*. A longstanding tenet in psychology is that individual behavior is a product of personal factors and environmental factors. Thus, the environmental factor of physical activity context requires the attention of health professionals.

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