College Students' Usage of Personal Music Players (PMP) During Exercise

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Abstract

The purpose of this study was to investigate the use of personal music players (PMPs) during exercise, including their purpose(s), how they affect exercise, and the most common music listened to. A representative sample of 184 undergraduate students from two separate university wellness centers completed a 17-item, content validated questionnaire containing demographic information and questions related to music and exercise preference and music player use. The most popular types of music listened to during exercise were hip hop (27.7%), rock (24%), pop (20.3%), and country (12.7%). The most common modes of exercise while listening to a PMP were free weights (27.2%), treadmill (26%), machine weights (19.6%), and elliptical trainer (17.4%). The most common reasons to listen to a PMP were "to work out harder," (22.4%) "make the exercise seem easier," (21.4%) and "to work out longer" (20.2%). Significantly more participants indicated they would work out more frequently while using a PMP (53.3% yes; 26% no, 21% unsure; X2 33.70, 2, p=<.001). In this sample, music appears to serve as a motivating factor, making exercise more pleasant and seem easier. These results may have positive implications for fitness professionals encouraging new exercisers.

Keywords: fitness, health, RPE, motivation

Introduction

Music plays a noticeable role in our everyday lives. For example, we listen to music as we drive our vehicles, do household chores, and work in our offices. We hear music in the elevator, in stores, and during commercials and cartoons on television. Music is both ubiquitous and often goes unnoticed; yet it is in many facets of our lives. An additional area in which music affects our lives is exercise, with recent literature noting that music can be influential during exercise. Tempo, volume, and style of music are some of the factors associated with exercise (Karageoghis, Jones, & Low, 2006; Priest, Karageorghis, & Sharp, 2004). Karageoghis, et al. investigated the relationship between heart rate and music tempo and found increased preference for fast tempo music as workload intensity increased. The authors also noted an overall preference for fast tempo music during exercise.

Priest, et al., (2004) had earlier studied the effects of tempo during exercise and found health club members preferred music that was upbeat and motivational. A wide variety of music types were also preferred during workouts. Exercisers preferred louder music, which served to improve their motivation for exercise.

Gfellar (1988) surveyed college students enrolled in an aerobic activity class regarding their attitude towards certain types of music played during class activities. It was found that 96% of the students liked music with a "good beat," and felt music with a good tempo provided a proper rhythmic structure and temporal cue for their aerobic activities in addition to providing added motivation.

Examining the effects of motivational music upon sub-maximal exercise intensity and affective responses such as attitudes during and after exercise and perceived effort, Elliot, Carr, and Orne (2005) engaged participants in three 20-minute cycle ergometer trials while listening to motivational music. The authors found that motivational music was a means of elevating sub-maximal exercise intensity, manipulating effort sense, improving in-task affect, and inducing positive attitudes towards the exercise experience. Participants in the music conditions exercised at a higher intensity (M = 122 Watts) compared to those in the no music condition (M = 108 Watts). Comparisons also revealed that participants traveled significantly farther ($p < .05$, d = .55) in the motivational music condition (M= 9.64 km, SD = 1.89) compared to the no music condition (M = 8.93 km, SD = 1.76) and reported significantly higher levels of in-task positive affect ($p < .04$, d = /1.12) in the music condition (M = /2.24, SD = 1.46) compared to the no music condition (M = /0.29, SD = 1.96).

Motivational music is subjective, however, and varies greatly from person to person. Therefore, in the above studies, the type of music selected was by the participants based on its intrapersonal motivation.

One newer aspect of music and exercise is the advent of the personal music player (PMP). PMPs are devices that allow music to be digitally downloaded or saved and then played 'on the go', such as an iPod or MP3 player. The iPod is small, lightweight, and can store a tremendous amount of music, yet it comes with a high price tag. One of the most popular features of PMPs is that the listener can download their own personal music favorites, which are also typically quite motivational. This is a noticeable change to when fitness club members were subject to facility-determined music, which individual exercisers may or may not enjoy.

One down side to PMP use during exercise is the headphones, or earbuds. Most headphone models are not designed to tolerate excessive moisture (i.e. sweat), which often accompanies exercises. In addition, some headphone cords are simply too short to provide a comfortable exercise and music listening experience (Cassity, 2007). Yet overall, iPods and other PMPs have now become somewhat of a 'must-have' exercise accessory. To date, much of the literature dealing with music and exercise has focused on facility-determined music that is played on loud speakers throughout the facility. Therefore, the purpose of this study is to investigate the use of PMPs during exercise, including their purpose(s), how they affect exercise, and what type of music is most commonly listened to during exercise.

Methods

Subjects

Data for this study were collected at two separate U.S. Midwestern university wellness centers, during the late fall of 2010. A total of 200 students completed a survey, however, only surveys completed by undergraduate students (M = 21.13 years,

SD = 3.83) (n=184) were retained for data analysis (98 males and 86 females; 38 freshman, 39 sophomores, 56 juniors, 51 seniors). Surveys were administered similarly at each site, as exercisers were approached throughout various locations of each wellness center, including the cardio and weight lifting areas, and entrance and lobby areas, to identify those with a PMP. After giving consent in accordance with the Institutional Review Board standards, participants completed the survey on site and handed them back to the researcher.

Instrumentation

Of the items on the self-constructed questionnaire (see appendix A), three questions required a yes/no response, three questions were multiple choice, one was a rank order question, one was 'all that apply', and the remaining were demographic questions. To establish content validity, three experienced health and wellness college faculty were identified as survey reviewers, for the purpose of clarity and understanding of the survey. The survey reviewers deemed the survey valid. Once all data were collected, surveys from both institutions were grouped for analysis, which was done using Predictive Analytic Software (PASW Statistics), version 18.0. Alpha was $p<.05$ for all tests.

Results

Descriptive statistics and Chi Square results for the sample are presented in Table 1. Each wellness center contributed about half of the completed surveys, and the class distribution of completed surveys was fairly equal (freshman [21%], sophomores [21%], juniors [30%], and seniors [28%]). The gender breakdown of completed surveys was 47% female and 53% male. Results from Chi square goodness of fit indicate the sample was evenly distributed for class, (X^2=5.17, p=.159), gender (X^2=.78, p=.376), and institution (X^2=.20, p=.658).

Table 1. ***Chi Square Goodness of Fit for Sample Demographics***

Category	N	Percent	
Class Distribution			
Freshman	38	21%	
Sophomore	39	21%	
Junior	56	30%	
Senior	51	28%	X2 (3, n=184) = 5.17(NS)
Gender			
Male	98	53%	
Female	86	47%	X2 (3, n=184) = .38 (NS)
Institution			
NDSU	89	48%	
OSU	95	52%	X2 (3, n=184) =.20 (NS)

Note. p < .05

The most common responses of music, exercise and PMP preference are presented in Table 2. The most popular types of music listened to during exercise were hip hop (27.7%), rock (24%), pop (20.3%), and country (12.7%). The most common mode of exercise, based on the most frequent written in responses, while listening to a music player was free weights (27.2%), followed by the treadmill (26%), machine weights (19.6%), and elliptical trainer (17.4%). In response to the question "why do you use a music player during exercise", the most frequent responses ranked in the top four were 1) "to work out harder", 2) "make the exercise seem easier", 3) "to work out longer", 4) "make the exercise more fun", and 5) "just like listening to music".

Table 2. ***Frequency of Responses of Music, Exercise and PMP Preference***

Music Type*		Exercise Mode*		"Why do you use a PMP?"**	
Hip Hop	127	Free Weights	114	"to work out harder"	150
Rock	110	Treadmill	109	"...exercise seem easier"	143
Pop	93	Machine Weights	82	"to work out longer"	135
Country	58	Elliptical	73	"...exercise more fun"	120

**most popular answers, not ranked*

***ranked by frequency of response in the top 4 ranks*

When participants were asked if there were certain types of exercise in which a music player was not used, weight lifting, team sports, calisthenics, and swimming were reported, however, very few respondents indicated not using their PMP during exercise. Running was the most common exercise in which students always listened to their music player. "Any cardio" and weight lifting also were common exercises for always using a PMP. When asked if the music player got in the way during exercise, 66% of respondents said yes. Having the headphone wires get in the way and the ear buds falling out were the two most common responses, and this was reported as typically occurring during running and weight lifting. Results of the influence of frequency of exercise are presented in Figure 1. Sixty percent of the students reported they would still exercise just as often without a PMP, and the majority (86.4%) of the students reported using a PMP for more than one year. When asked if having a music player made them work out more frequently, a significantly higher proportion indicated 'yes' (53.3%) compared to 'no' (26%) or 'unsure' (21%) (X^2=33.69, p<.001).

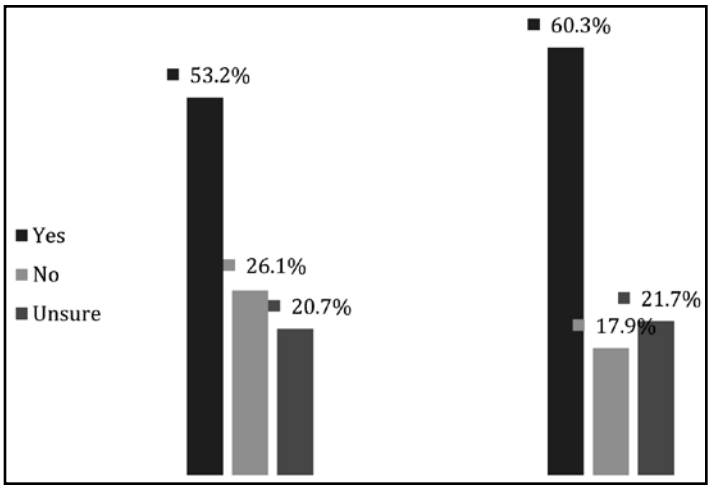

Figure 1. PMP influence on frequency of exercise

Discussion

The purpose of this study was to investigate the use of PMPs

during exercise, including their purpose(s), how they affect exercise, and what type of music is most commonly listened to during exercise. Results from this study indicate PMPs help people work out more frequently, more intensely, and for longer durations. Music players also made exercise seem easier and more fun, which likely decreased the ratings of perceived exertion (RPE). This result is consistent with previous studies that have examined the effects of music on performance, physiological responses, and RPE (Mohammadzadeh, Tartibyan, & Ahmadi, 2008; Potteiger, Schroeder, & Goff , 2000; Elliott, et al., 2005).

Mohammadzadeh, et al., (2008) found listening to music had positive effects on performance as well as psychological state (e.g RPE) during progressive exercise. Participants who listened to music had lower overall RPE's (using the Borg RPE scale) (M = 3.64, SD =1.43 and M = 3.82, SD = 0.97 for trained and untrained participants respectively) during the exercise protocol (Bruce Treadmill Protocol) and time to exhaustion was longer (M= 13.4, SD = 0.75 (trained) and M = 11.23, SD = 0.25 (untrained) compared to those who exercised without listening to music (M = 3.98, SD =1.51(trained) and M = 4.79, SD = 1.02 (untrained); M= 13.25, 0.89 (trained) and M = 10.94, SD = 0.36 (untrained)). ANOVA results in the Mohammadzadeh et al. study revealed a significant music and fitness interaction ($F = 7.03$, $p < .05$) suggesting a greater effect of music on those participants who were untrained. This suggests those who are just beginning an exercise program may benefit even more from listening to music than their trained counterparts. Potteiger, et al., (2000) also discovered lower ratings of perceived exertion among participants exercising at the same intensity level. Upon measuring heart rate and measures of RPE on subjects performing 20 minutes on a cycle ergometer at 70% VO_{2peak}, it was found that music had no affect on heart rate during exercise, yet had significant effects on RPE. Overall RPE was significantly lower in all three music conditions (fast music, classical, and self-selected) when compared to the no music condition at all intervals (5, 10, 15, and 20 minutes). These researchers suggested that music can act as an effective distracter during exercise, thus making exercise seem easier while exercising at the same intensity level. Elliot et al., (2005) also concluded that motivational music can improve attitude towards exercise and reduce sense of effort during exercise, thus making exercise "more fun" and "seem easier."

In addition to these popular reasons for why participants used a PMP during exercise, another popular survey response in this study was to "work out longer." This is similar to results from a study by Nakamura, Papini, Pereira, Nakamura, and Kokubun, (2010) in which participants were able to perform longer/farther while cycling at a high intensity while listening to music they preferred. Participants performed five test sessions; two to establish critical power intensity, and three at critical power intensity to exhaustion under each of the music conditions (no music, preferred music, and non-preferred music). Participants cycled significantly longer in the preferred music condition (M = 21:05 min, SD = 9.8) compared to the non-preferred (M = 17:20 min, SD = 7.5) and the no music conditions (M = 15:00, SD = 7.3). Since the cycling velocity was fixed, changes in exercise duration were associated with cycling distance; thus concluding preferred music improved performance. This study also measured RPE and found a significant main effect condition ($F = 4.9$, $p = .007$; $\square^2 = 0.32$) on RPE response and post hoc analysis revealed RPE in the non-preferred music condition was significantly ($p = .007$) higher than in the preferred music and no music ($p = .026$) conditions.

Individuality regarding when participants used their PMP was revealed through the survey in this study as well. For example, some students did not use their music player during weight lifting, while others always used it during weight lifting; some always used it while running on the treadmill, but not while running outside; and some used it while running outside, but chose to watch TV on the treadmill and other cardio machines.

Conclusion

Results of this study may have positive implications for personal trainers, fitness professionals, and health promoters. A common reason for not exercising or discontinuing exercise is lack of motivation or the dullness of the exercise (Mohammadzadeh, et al., 2008). Music can serve as a motivating factor, making exercise more pleasant and seem easier, and improve performance. Individuals just starting an exercise program are motivated by positive results, and exercising with a PMP may assist in reaching that outcome. By exercising for a longer duration and at a higher intensity while listening to music, most people will reach their fitness goals sooner rather than later, thus leading to greater motivation and continued exercise participation. PMPs can also be used as incentive for health promoters to encourage participants to reach their goals and continue exercise once the program ceases.

Limitations to this study include virtually all participants being college students who were white Anglos. However this may be offset since the study participants were spread across two campuses and all four years of undergraduate study. Regardless, the results may not be applicable to exercisers that are above the average undergraduate college student age, are more ethnically diverse, or those with chronic health conditions.

Finally, it is clear that exercising with a PMP has become the norm, particularly in college wellness centers, and that using a PMP makes exercise more enjoyable. Encouraging exercisers to use and select their own music may be one of the most critical aspects of keeping individuals motivated towards long-term exercise sustainability.

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Appendix A
Survey Questions for Student Usage of Music Players During Exercise

Rank the reasons why you listen to your music player while exercising? (1 being the most important, 2 is next most, etc.)

o It helps me work out longer
o It helps me work out harder or more intense
o It makes the exercise seem easier or gets done faster
o I like listening to music, regardless of exercise or not
o It makes exercising more fun
o It keeps me from having to talk to others
o Other

What type of music do you listen to while you work out? (Please check all the types of music you listen to.)

_ Country _ Blues
_ Pop _ New Age
_ Rock _ Alternative
_ Hip Hop _ Movie Soundtracks
_ Opera _Other

Are there certain exercises in which you do not use your music player?

Are there certain exercises in which you always or almost always use your music player?

Does your music player ever get in the way of your exercise (wires, ear buds or the IPOD itself), and which exercises?

If you didn't have a music player, would you still work out as often?

_Yes
_No
_Not sure

How long have you been using a music player while exercising?

_< 6 months
_6 - 12 months
_ more than one (1) year

Did you exercise regularly before you had a music player, And if so, for how long prior?

_I did not exercise before having a music player
_i exercised for less than 6 months before having a music player
_i exercised for about 6-12 months before having a music player
_i exercised for more than a year before having a music player
_I have always exercise with a music player

Has listening to your music player made you workout more frequently?

_ YES
_ NO
_Not sure

In the future, do you think you will continue to listen to your music player during exercise?

_ YES
_ NO

Age: ____

Year in School: Fr Soph Jr Sr. Grad. Student

Gender: M F

Preferred Types of Exercise (with or w/o music)

_treadmills
_ellipiticals
_stationary bikes
_Free weights
_Machine Weights
_Group exercise classes
_Other

Ethnicity:

__ Asian American
__ Black/ African American
__ Caucasian/White
__ Mexican-American/Latino
__ Native American
__ Other

Estimate height:____

Estimate weight: ___

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