

Supplementary Materials

Table S1. Correlation between music features and learning experience on the entire dataset

Music features	<i>rmcorr</i> coefficient		
	PLE	AST	CON
Dynamics			
rmse_std	.004	.121	.032
Rhythm			
tempo	.023	-.066	-.021
avg_onset_freq	-.044	-.099	-.038
Timbre			
rolloff_mean	.106	.154	.194*
rolloff_std	-.046	-.041	-.042
centroid_mean	.105	.149	.188*
centroid_std	-.046	-.010	-.003
flatness_mean	.109	.111	.155
flatness_std	-.010	-.003	-.015
zcr_mean	.084	.126	.150
zcr_std	-.014	-.004	.020

Note. N=30, L=195 (number of sessions); *p < .05; PLE=perceived learning effect, AST=altered sense of time, CON = total concentration on the task at hand.

Table S2. Correlation between music features and learning experience under low vs. high mental demand

Music features	Low mental demand			High mental demand		
	PLE	AST	CON	PLE	AST	CON
Dynamics						
rmse_std	-.129	.111	.094	.050	-.068	-.114
Rhythm						
tempo	-.056	-.061	.004	.051	-.116	-.108
avg_onset_freq	-.078	-.071	-.092	-.015	-.059	.274
Timbre						
rolloff_mean	-.033	.190	.275*	.262	.069	.102
rolloff_std	-.200	-.018	.017	.131	-.136	-.014
centroid_mean	-.037	.183	.268*	.245	.051	.064
centroid_std	-.207	.043	.108	.091	-.177	-.075
flatness_mean	-.051	.154	.289**	.226	-.023	-.046
flatness_std	-.092	-.005	.072	-.080	-.160	-.179
zcr_mean	-.032	.138	.201	.151	.037	-.052
zcr_std	-.152	.091	.123	.037	-.247	-.134

Note. N=30, L=111 (low), L=84 (high); * p < .05, ** p < .01; PLE = perceived learning effect, AST = altered sense of time, CON = total concentration on the task at hand.

Table S3. Correlation between music features and learning experience under low vs. high temporal demand

Music features	Low temporal demand			High temporal demand		
	PLE	AST	CON	PLE	AST	CON
Dynamics						
rmse_std	.060	.207	.231*	-.048	.008	-.139
Rhythm						
tempo	-.130	-.015	.051	.059	-.179	-.126
avg_onset_freq	-.045	-.120	-.065	.038	-.113	.117
Timbre						
rolloff_mean	.051	.299*	.285*	.175	-.027	.145
rolloff_std	-.022	.005	-.037	.058	-.153	-.029
centroid_mean	.051	.302**	.297*	.162	-.034	.117
centroid_std	-.057	.082	.041	.070	-.186	-.053
flatness_mean	.080	.241	.304**	.159	-.016	.066
flatness_std	-.051	-.003	.019	.026	-.020	-.039
zcr_mean	.056	.285*	.278*	.077	-.033	.040
zcr_std	-.054	.141	.096	.026	-.216	-.071

Note. N=30, L=100 (low), L=95 (high); * $p < .05$, ** $p < .01$; PLE = perceived learning effect, AST = altered sense of time, CON = total concentration on the task at hand.

Table S4. Correlation between music features and learning experience within subgroups of participants (low vs. high working memory capacity)

Music features	Working memory capacity					
	Low (N=15)			High (N=15)		
	PLE	AST	CON	PLE	AST	CON
Dynamics						
rmse_std	.016	.204	.085	-.004	.077	-.010
Rhythm						
tempo	.163	-.205	-.084	-.070	.007	.027
avg_onset_freq	-.148	-.159	-.068	.062	-.060	-.004
Timbre						
rolloff_mean	.096	.263*	.290**	.117	.085	.099
rolloff_std	.009	-.056	.060	-.100	-.033	-.153
centroid_mean	.109	.269*	.287**	.104	.070	.086
centroid_std	.006	-.001	.110	-.104	-.018	-.140
flatness_mean	.109	.179	.266*	.120	.063	.014
flatness_std	-.041	-.095	.106	.014	.053	-.120
zcr_mean	.139	.289**	.262*	.031	.007	.024
zcr_std	.068	.032	.154	-.092	-.032	-.123

Note. L=95 (low), L=100 (high); * $p < .05$, ** $p < .01$; PLE = perceived learning effect, AST = altered sense of time, CON = total concentration on the task at hand.

Table S5. Correlation between music features and learning experience within subgroups of participants (low vs. high multitasking ability)

Music features	Multitasking ability					
	Low (N=15)			High (N=15)		
	PLE	AST	CON	PLE	AST	CON
Dynamics						
rmse_std	-.063	.225	.200	.032	.082	-.062
Rhythm						
tempo	.077	-.044	.012	-.002	-.077	-.042
avg_onset_freq	.040	-.067	.059	-.108	-.131	-.135
Timbre						
rolloff_mean	.121	.302*	.400**	.100	.087	.054
rolloff_std	.097	.003	.096	-.131	-.067	-.153
centroid_mean	.140	.307*	.413**	.088	.078	.038
centroid_std	.072	.068	.179	-.118	-.054	-.152
flatness_mean	.184	.214	.339**	.066	.055	-.002
flatness_std	-.066	-.086	-.022	.014	.030	-.011
zcr_mean	.158	.298*	.398**	.049	.052	-.008
zcr_std	.080	.076	.236	-.061	-.042	-.127

Note. L=79 (low), L=116 (high); * $p < .05$, ** $p < .01$; PLE = perceived learning effect, AST = altered sense of time, CON = total concentration on the task at hand.

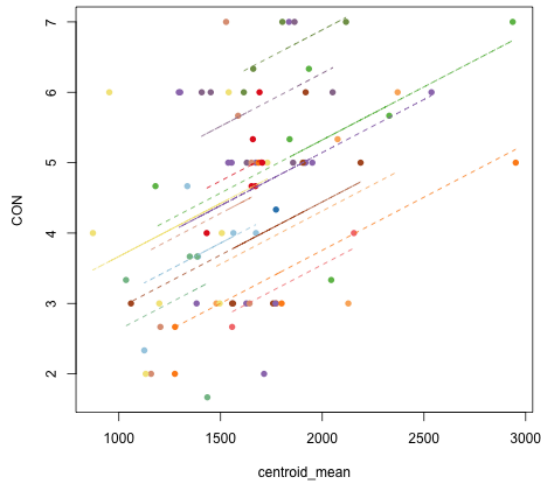
Table S6. Descriptive statistics of survey measures

	Min	Max	Median	Mean	SD
Mental demand	1.00	7.00	4.00	4.14	1.62
Temporal demand	1.00	7.00	4.00	4.37	1.63
Valence (pre-session)	-1.00	1.00	0.00	0.03	0.41
Arousal (pre-session)	-0.93	1.00	0.00	-0.11	0.43
Valence (post-session)	-1.00	1.00	0.10	0.10	0.42
Arousal (post-session)	-1.00	1.00	0.00	-0.05	0.46
Altered sense of time	1.00	7.00	4.67	4.53	1.47
Concentration	1.67	7.00	5.00	4.61	1.49
Perceived learning effect	1.00	7.00	4.00	4.10	1.59

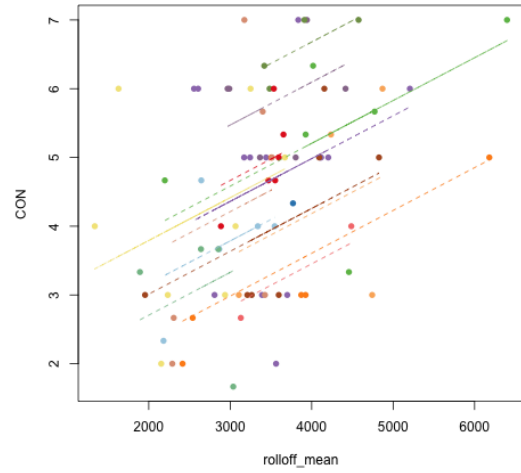
Note. SD = Standard deviation.

Figure S1. rmcorr values between music features and total concentration on the task at hand (CON) for participants with low multitasking ability (N = 15).

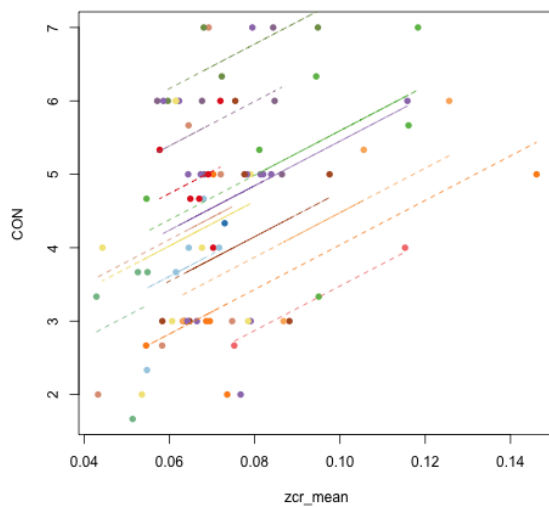
(a) Mean centroid ($r = .413, p < .01$)



(b) Mean rolloff ($r = .400, p < .01$)



(c) Mean zero-crossing rate ($r = .398, p < .01$)



Note: Each dot in the plots represents an observation for a studying session, with observations for each participant showing a different color. Each line depicts correlation between two variables of each participant across sessions.