Evaluation of Injury Prevention Programs

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HPH 580: Practicum

May 13th, 2021

Introduction

Physical exercise interventions are important injury prevention strategies to decrease the risk of falling and accidental injuries through strengthening body functions (Etman et al., 2012; Vlaeyen et al., 2015; Szigeti et al., 2018; Thomas et al., 2019). Physical exercise workshops promote bone health and reduce the risk of osteoporosis; therefore, they are considered as effective interventions that prevent accidental falling (Szigeti et al., 2018). Prevention programs participants showed 22% fewer recurrent fallers compared to the control group (Vlaeyen et al., 2015). Effectiveness of prevention programs displays the need to expand the current practice and reach of fall prevention programs into a greater arena, so more individuals and communities will have access to physical exercise interventions.

The Trauma Center offers fall prevention programs that aim to improve balance and reduce fall incidences (Stony Brook Trauma Center, n.d.). A variety of interventions are implemented to improve the adult's balance, trunk stability, and muscle functions, including Stepping-On, Tai Chi, and Matter of Balance Workshop (Stony Brook Trauma Center, n.d.). Their initial focus and reach was only local communities in Suffolk County where most participants were elderly, white females, with high education levels (Table 1). Due to the highly clustered participants with similar demographic characteristics, the reach and impact of prevention programs were restricted in a single population. With the pandemic undertaking and the launch of virtual exercise workshops, Trauma Center achieved limitless reach across the nation through delivery fall prevention programs remotely.

While injury prevention programs were delivered with a wider reach through virtual sessions, it brought new challenges in streamlining data collection and evaluation. When the program moved from in-person to virtual during the pandemic, the program response rate for

virtual sessions dropped to 55%, which demonstrated the need to implement new strategies to promote program participation. Additionally, registering participants virtually caused a large amount of missing information and generated barriers for the impact evaluation. Moreover, managing and tracking attendance was another challenge because the instructor could not take attendance physically; therefore, an efficient way to track attendance virtually would be essential to accurately reflect the program completion rate. Lastly, the preceptor requested to examine the association between the design of the class and completion rate in order to support evidence-based practice in the future.

The main purpose of this project was to develop a trauma database to trace participants' demographic information, program attendance, and survey response. Pre- and post-completion data were compared to assess the needs, trace participation process, and analyze the program impact. The additional purpose of the practicum project was to evaluate the effectiveness of the injury prevention program through comparing injury cases, self-perceived risk, self-reported health, and body functions in physical examination. Health indicators were evaluated by pre- and post-survey to demonstrate the effectiveness of prevention programs and program impacts.

Methods

Data were collected from the Trauma Registry and previous fall prevention programs. Types of data collected were registration reports that included participant's personal information, attendance sheets that kept track of participation, and pre- and post-surveys developed by Administration of Community Living that determined the program impact.

Retrospective data from 3 three program series were processed and evaluated, including the in-person sessions (N=1516), Fall 2021 virtual sery (N=491), and Winter 2021 virtual sery (N=442). Data were cleaned and processed using data wrangling strategies to structure data for

further analysis and research. Data were analyzed using SAS to examine potential factors associated with the completion rate and the effectiveness of the program. Logistic regression models and paired t-test were employed to compare the program impact based on pre/post survey responses.

For the purpose of tracking participants in virtual series, participants were given an unique identifier that would follow them for the entire program to manage their registration, attendance, and survey responses. In the retrospective data, the first 7 letters of the email address were used to identify participants. In future virtual series, ID was automatically generated with the first 2 letters of first name, first 2 letters of last name, and the last 4 digits of phone number. This process ensured that the ID would be unique for every participant. Once participants were registered with their personal information, our records would accurately identify the person entering the virtual session.

Completion rate was an important indicator to evaluate the program impact. According to the Trauma Registry, completion rate was calculated from the ratio of completer and the total participants (Datta et al., 2007). If the participant attends more than or equal to 16 classes, the person would be considered as a completer because of enough exposure to interventions. Physical exercise classes were offered in multiple levels from low to high in order to match with different ability to exercise. Participants may choose to participate 1 session or multiple sessions during a single program period which aimed to increase the total attendance. Attendance from every session and level they attend would count toward their total attendance.

Results

The completion rate has dramatically decreased in the virtual session. Fall 2021 sery has the overall program completion rate of 11.40%. Winter 2021 sery has the overall program

completion rate of 15.61%. Factors associated with the completion rate were the total attendance, the number of sessions registered, and the highest level attended. The total attendance determined if the participant was a completer or not, so the method focused on promoting attendance through applying a different design of the program. Allowing people to register for multiple sessions increased the total attendance. Results matched with the hypothesis that people who register for multiple sessions would have a higher completion rate (Table 2.1 & Table 2.2). Attending different sessions encouraged the program engagement and increased the total attendance. Besides, participants who were registered for multiple workshops displayed a higher completion rate, compared to people who were in a single workshop. Findings suggested multiple sessions registered increased the participant's total attendance; therefore, they were more actively engaged in the program and more likely to be a completer.

<u>The overall completion rate</u>

- Across 8 sessions in Fall 2021 sery, there are 56 completers, so the completion rate is 11.40% (=56/491).
    - Part 1 has 147 participants and 6 completers. The completion rate is 4.08% (=6/147)
    - Part 2 has 62 participants and 4 completers. The completion rate is 6.45% (=4/62)
    - Part 3_1 has 59 participants and 8 completers. The completion rate is 13.56% (=8/59)
    - Part 3_2 has 116 participants and 35 completers. The completion rate is 30.17% (=35/116)
- Across 8 sessions in Winter 2021 sery, there are 81 completers, so the completion rate is 15.61% (=81/442).
    - Part 1 has 177 participants and 19 completers. The completion rate is 10.73% (=19/177)
    - Part 2 has 78 participants and 19 completers. The completion rate is 15.38% (=12/78)

- Part 3_1 has 50 participants and 10 completers. The completion rate is 16% (=8/50)
- Part 3_2 has 137 participants and 33 completers. The completion rate is 21.90% (=30/137)

For the purpose of program evaluation, the logistic regression was performed on the RedCAP data to examine the association between the program completion rate and multiple predictor variables that demonstrated health outcomes (Table 3). The program completion rate was positively associated with race/ethnicity, education level, self-report health, the number of sessions registered and negatively associated with age, sex, number of fall, injury, and chronic conditions. Small estimate association indicated that there was a weak association between the completion rate and predictors. In addition, the paired sample t-test was performed to determine the program impact (Table 4). Pre/post survey responses were compared to evaluate the mean difference of the predictor. Mean differences between before and after completing the program showed that there were improvements in health status, protection, strength, steady, exercise, activity level, and attitudes towards life. There was a decrease in the number of fall, injury, and self-perceived risk and fear. Due to the data structure and large amount of missing data, predictors were not statistically significant, but it was meaningful to understand the correlation and point out the direction for the design of the fall prevention program.

Deliverables

Deliverables were posted on the Digication page, including SAS files for data processing and data analysis, student showcase presentation, and NCOA On-Demand presentation.

Discussion

In conclusion, the practicum project provides an unique opportunity to practice public health concepts and models in a real-world setting, which allows deeper understanding about

how health analytical strategies were implemented in public health organization. In the fall prevention programs data project, I identified problems, established a strategic plan, overcame challenges, and finally achieved the goal of the project.

Due to the large number of missing data and low survey response rate in the post-COVID data, findings on virtual sessions may not accurately reflect the program impact and may fail to determine the influence of pandemic on program participation. Results were not generalizable to the overall effectiveness of fall prevention interventions and other prevention programs.

While there will be limitations in the data analysis due to the large number of missing post surveys, findings of the study will be meaningful to improve the current program practice and suggest future interventions. The evaluation of the program impacts demonstrated fall prevention interventions have a positive influence on the participant's overall health condition and fall-related outcomes. Enhanced data collection methods will help to better track program participation and support evidence-based practice in the future. As the delivery of virtual sessions is moving forward, more improvement on data collection and analysis methods can be made in order to enhance the current practice of fall prevention programs.

References

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Appendix

Table 1. Participant's Demographic Information

Demographic Information	
Age group	Ranges from 47-94
Race/ethnicity	White (91.01%), Others (8.99%)
Sex	Male (19.62%), Female (78.90%)
Education	High School and under (13.60%), College and higher (83.74%)

Table 2.1 Relationship between Number of Session Registered and Completion Rate in Fall 2021

Fall 2021: Relationship between Number of Session Registered and Completion Rate			
Number of Sessions	Completers	All Participants	Completion Rate
1	14	285	4.9%
2	22	109	20.2%
3	8	17	47.1%
4	4	18	22.2%
5	0	1	0%
8	4	6	66.7%
Total	69	413	

Table 2.2 Relationship between Number of Session Registered and Completion Rate in Winter 2021

Winter 2021: Relationship between Number of Session Registered and Completion Rate			
Number of Sessions	Completers	All Participants	Completion Rate
1	33	285	11.6%
2	18	93	19.4%
3	8	19	42.1%
4	3	5	60%

6	1	2	50%
7	2	4	50%
8	4	4	100%
Total	52	436	

Table 3. Association between Completion Rate and Fall-Related Predictors

Predictors	Estimate	S.E.	P-value
Age	-0.0017	0.005	P=0.7476
Sex	-0.7354	0.751	P=0.3045
Race/ethnicity	0.0751	0.472	P=0.8737
Education Level	0.3742	0.786	P=0.7347
Self-report Health	0.1562	0.200	P=0.4364
Number of Fall	-0.2892	0.155	P=0.0614
Number of Injury	-0.1191	0.211	P=0.5729
Number of Chronic Conditions	-0.089	0.092	P=0.3351
Number of Session Registered	0.4219	0.063	P=0.0942

Table 4. Comparative Fall-Related Outcomes by Pre/Post Completion

Predictors	Mean Difference
Self-report Health	1.1315
Number of Fall	-2.5672
Number of Injury	-0.1765
Self-perceived Risk	-0.1823
Self-perceived Fear	-0.1348
Protection	0.3049
Strength	0.3862
Steady	0.3838
Exercise	0.3227
Activity Level	0.2596
Attitude towards Life	0.1624