DOI:
10.1002/JPER.18-0385

Document Version
Peer reviewed version

The effect of risk communication on periodontal treatment outcomes; a randomized controlled trial

Koula Asimakopoulou PhD., Reader in Health Psychology, King's College London, Dental Institute.

Matthew Nolan MSc., General Dental Practitioner, Merivale Dental Practice.

Claire McCarthy MA., PhD student, King's College London, Dental Institute.

J. Tim Newton PhD., Professor in Psychology as Applied to Dentistry, King's College London, Dental Institute.

Running title

Risk communication & periodontal disease

Summary

A psychological intervention using risk communication goal-setting, planning and self-monitoring can improve clinical outcomes in patients with periodontal disease

Corresponding Author

Dr. Koula Asimakopoulou

King's College London, Dental Institute

Guy's Hospital, Floor 18,

Great Maze Pond, London, SE1 9RW

Tel: 0208 1884382

koula.asimakopoulou@kcl.ac.uk

Declaration

This study was jointly supported by grants from the Oral and Dental Research Trust and King's College London Dental Institute.

Word Count: 3259 Figures: 1 Tables: 3 References: 26

Abstract

Background: The study determines the effects of a routine assessment (Treatment-as-Usual, TAU) vs. a risk communication intervention (Risk) vs. a Goal-Setting, Planning and Self-monitoring (GPS) intervention on periodontal disease patients' clinical and psychological outcomes. **Materials and Methods**: In a three-arm randomized controlled trial (RCT; registration: ISRCTN59696243), adults (N=97), judged to have moderate oral hygiene attended a primary dental care setting for a standard consultation. Intervention participants received an individualized calculation of their periodontal disease risk using only the Previser Risk Calculator (Risk group) or supplemented with a GPS-behavioral intervention (GPS group). Clinical, behavioral and psychological measures were obtained at baseline, 4 and 12 weeks later. **Results**: Percent plaque reduced significantly ($p<.05$) in intervention groups but not in TAU group. Percent of sites bleeding-on-probing reduced in all groups, but the effect was more pronounced in the intervention groups. Interdental cleaning frequency improved only in the intervention groups ($p<.05$). Brushing frequency and probing depths showed little variation across time/groups. Disease risk and most thoughts about periodontal disease changed across time ($p<.05$). **Discussion**: A simple behavioral intervention using individualized periodontal disease risk communication, with or without GPS reduced plaque and bleeding and increased interdental cleaning over 12 weeks. **Conclusion**: Risk communication and behavioral techniques such as Goal-Setting, Planning and Self-monitoring can improve periodontal outcomes.

Keywords: behavioral science, clinical trial(s), public health, risk

Introduction

Periodontal disease is a major cause of tooth loss[1]; controlling it requires a partnership between the dental team and the patient[2]. One way to improve patients' oral hygiene-related behaviors is through the effective communication of the individual's risk of acquiring the disease[3].

As the vast body of message-framing literature has shown[4-6], shaping how health information is presented to patients may influence their subsequent health behavior where loss-framed messages, in some contexts, might lead to fear[7]. Although the use of fear to motivate behavior change has recently been questioned[8], psychological models such as Protection Motivation Theory (PMT) propose that, fear, coupled with discussion of coping strategies maybe beneficial in eliciting behavior change in patients[9]. Specifically, the PMT model suggests that beliefs about susceptibility to an illness and disease seriousness, the patient's ability to perform behaviors required to control the illness and the difficulty of these behaviors, and finally, the patient's fear surrounding the disease, influence health-related behavior. Previous PMT-based work on periodontal disease patients, reported that the communication of individualized risk scores in patients with periodontal disease successfully influenced psychological variables that underpinned treatment adherence[3]. This study, however, did not examine the impact of the risk information on clinical indicators of periodontal disease.

Research in behavior-change science has highlighted the importance of three inter-related components, as seen in the Capability-Opportunity-Motivation-Behavior model (COM-B,[10]). The components of the model are 1) capability (C) i.e. does the person have the physical (e.g. hand-eye coordination) and psychological (e.g. knowledge) skills to perform the behavior 2) opportunity (O), i.e. are the physical (e.g. access) and social environments (e.g. societal beliefs about the need to maintain oral health) such, that the person feels enabled to undertake the new behavior and 3) motivation (M) i.e. is the change supported by the person's conscious (e.g. planning) and automatic (e.g. habit) processes responsible for any behavior? Asimakopoulou and Newton[8] called for

the use of this model in dentistry research and the study presented here is the first to report on a COM-B based intervention on periodontal patients.

A systematic review of psychological approaches to behavior change for improved plaque control, concluded that, **"...**goal-setting, self-monitoring and planning are effective interventions for improving oral hygiene-related behavior in patients with periodontal disease**"**[11], and proposed a Goal-setting, Planning, Self-Monitoring (GPS) intervention to support behavior change in these groups. Goal-setting interventions usually involve the patient setting SMART (where SMART refers to: Specific, Measurable, Achievable, Realistic and Time-Specific) goals. Planning usually involves making If-Then plans, about how the person will deal with barriers that threaten their goal (e.g. **"**If I forget to brush my teeth in the evening, then I will put the toothbrush in a prominent place the following day to remind me to do it**"**). Monitoring is about keeping behavior under check by e.g. ticking a list eve very time the behavior is performed.

This paper reports on a COM-B-inspired intervention using individualized risk communication, to improve clinical, psychological and self-reported behavioral outcomes. In line with PMT and COM-B models, best practice on risk communication[12] and evidence regarding risk communication in dental settings [13] the study examined the following research hypotheses:

A behavioral intervention comprising risk communication (Risk) or Risk communication supplemented by Goal-setting, Planning and Self-monitoring (GPS) will affect

1. clinical (plaque, bleeding on probing, probing depths)
2. behavioral (self-reported brushing and interdental cleaning) and
3. psychological (thoughts about periodontal disease) outcomes differently than Treatment as Usual (TAU) at 4 and 12 weeks post-intervention.

Materials and Methods

Design

This RCT compared a control (TAU), an individualized risk communication (Risk group) and an individualized risk communication supplemented with a GPS intervention group (GPS). The arms

mapped onto COM-B, where TAU arm addressed patients' Capability, the Risk arm addressed Capability and Motivation and the GPS arm addressed Capability, Motivation and Opportunity. The study protocol received clearance from a University Ethics Committee (reference: HR14/151739) and the study was conducted in accordance with the Helsinki Declaration of 1975 as revised in 2013. No changes were made to the trial protocol or outcome measures after trial commencement.

Participants

Patients were recruited from a primary dental care practice in London, UK and were existing patients with a history of moderate oral hygiene. Participants were invited to a 30-minute appointment between 10/05/2015 - 01/14/2016. Poor oral hygiene was recorded when a clinical judgment was made of gross generalized deposits of plaque. Moderate hygiene patients were defined as those judged as having more than 3 localized deposits of plaque present. Current smokers and those who had smoked within the previous 30 days were excluded along with patients who had medical conditions or were taking medication (incl. antibiotics) likely to affect the periodontal status. Also excluded were those with psychiatric co-morbidity or physical disabilities likely to reduce their ability to clean their teeth and patients using an antiseptic mouthwash or diagnosed with gingival overgrowth. No exclusion criteria relating to the last time patients had periodontal debridement were applied. Some eligible patients were excluded if they failed to attend their appointment, or refused participation due to pain, lack of time or lack of interest in the study. Eligible patients were randomized through a random digit generator. Patients were not required to have evidence of attachment loss as an entry requirement.

Given that to date there have been no previous studies exploring the impact of risk communication, Goal-setting, Planning and Self-monitoring in combination, the sample size was based on Norman et al[14] together with a consideration of the feasibility of recruiting to the trial in general dental practice. This suggested that we aim for a minimum of 24 participants per group, in order to discover a large effect size.

A £100 (approx.$130) shopping voucher incentive was offered to participants completing the study through a prize draw [15]. Written informed consent was obtained from all participants.

Procedure

Data were collected at Baseline, 4 weeks (Time 2) and12 weeks (Time 3). At baseline, demographic information, self-reported oral hygiene over the past 7 days, and psychological variables (PMT measure assessing self-efficacy, threat and coping appraisals and intention to change behaviour) were recorded pre-consultation. Post consultation, PMT variables were re-assessed. The PMT measure was scored using seven-point Likert scales (ranging from 1: Not at all to 10: Extremely so). A full description of the content of the measure has been reported previously[3]. At baseline assessment, plaque, bleeding on probing and probing depths were recorded. Current risk and disease score were calculated using Previser software (available from www.previser.com and freely available for educational purposes). Probing depths and risk and disease scores were re-assessed at Time 3. Plaque and bleeding on probing were assessed at every visit as were all self-report data.

Plaque was the primary outcome whilst bleeding on probing and risk scores were secondary clinical outcomes. All behavioural (brushing and interdental cleaning) and psychological (PMT thoughts about periodontal disease) self-reports were treated as secondary outcomes. A percentage plaque index (PI) was used to assess the presence or absence of plaque at 4 sites and expressed as a percentage[16]. Bleeding on probing (BOP) was measured at 6 sites per tooth and expressed as a percentage[17]. A periodontal screening examination was carried out per sextant and allocated to one of three categories according to deepest probing depth found (<5mm, 5-7 mm, 7+mm).

The clinical data were collected solely by one clinician (MN) who had been trained and calibrated in all study procedures. In accordance with the recommendations of CONSORT[18] participants were not allocated to the study arms until after baseline data had been collected. Arm allocation

was deliberately concealed from the clinician at Times 2 and 3, however, as the same clinician administered the intervention and collected all clinical data, they may not have remained blind as to the allocation. A research nurse was responsible for participant recruitment, allocation and collection of self-report measures as well as allocation concealment, through the use of opaque envelopes.

Control participants received treatment as usual (TAU) comprising of oral hygiene, discussion about periodontal disease and a generic leaflet. Participants in the second arm (Risk Group) received an additional 5-10-minute explanation of their individualised risk using Previser±. Previser is an online tool providing an objective analysis of patient susceptibility and severity to periodontal disease, expressed using numerical value and colour coding on a scale of 1 (very low) to 5 (very high). The patient's specific risk profile and where their risk sat in the 1- 5 scale, was then discussed using a standard script developed for the study. Patients were supported in discussing behaviours to reduce their risk of periodontal disease progression. Patients in the third arm received the Risk intervention supplemented by GPS. This consisted of setting SMART goals to target their behaviour, recording self-care in a checklist to self-monitor activity for 12 weeks and completion of a plan to help them adhere to their goals. The 'If-then' plan involved clinician and patient anticipating barriers to achieving agreed goals and how they may be overcome.

Statistical analyses

Descriptive analyses were performed on an Intention to Treat (ITT) basis and blind as to condition allocation, following data inspection for outliers by two researchers (KA and JTN). Chi-square tests were used to test for associations between the three arms and frequency variables (nationality, gender). Where Two-Way ANOVAs indicated a significant effect, this was explored further with repeated measures ANOVAs. At T2 and T3, analyses were adjusted for multiple comparisons using a more conservative alpha level of $p<.01$. One-way ANOVAs tested for differences between the three arms in demographics (age, years of education) baseline psychological items

(PMT), self-reported brushing and inter-dental cleaning, and clinical (risk, plaque and bleeding on probing) outcomes. All statistical analyses were performed using SPSS version 24.

± PreViser. Oral Health Innovations Ltd. Birmingham Research Park, Vincent Drive, Birmingham B15 2SQ

Results

All 306 patients who had scheduled routine appointments during the study period were assessed for eligibility. N=206 were excluded (see Figure 1). Post-screening N=97 remained eligible. Of these, N=32 were allocated to the TAU group (Discussion +Advice), N=32 were allocated to the Risk group (Discussion, Advice + Individualized risk information) and N=33 were allocated to the GPS intervention (Discussion, Advice, Individualized risk information + Goal setting, Planning and Self-monitoring). Between baseline and 12-week follow-up 4 people were lost as their follow-up appointments fell outside the study recruitment period. Participant retention rate for this study was 96%.

At the 95% confidence level the sample size of N=97 gave the study power of 90% to detect a small (d=0.25) intervention effect. The study was, thus, deemed appropriately powered.

---- Figure 1 about here CONSORT chart------

The PMT measure was assessed for reliability. Overall scale Cronbach's alpha was =.59, improving to =.703 if the 'barriers' item was removed- this item was thus excluded from further analysis. Individual subscale alphas were not available as each subscale construct was measured by a single item.

The final sample (N=97) was older (mean age=60.61, SD=11.24 years) and broadly equally split across gender (N females=54). Most participants described themselves as White (N=91), British (N=92) and having received higher education (M years education=16.96, SD=3.68). No participant had fewer than 24 teeth.

There were no significant differences at baseline between the three study arms in any demographic, psychological, behavioral or clinical variables (all $p>0.05$) confirming the success of the randomization procedure.

Clinical outcomes

Descriptive statistics for the primary (plaque) and secondary clinical outcomes (bleeding on probing and Previser Risk and Disease Risk score) are shown in Table 1. Probing depth frequencies appear in Table 2. Mean percentage plaque and bleeding on probing appear in the Table and have been inferentially analyzed.

---------- Table 1 about here----------

Plaque

The approximate 3% mean plaque reduction in the TAU group across the 12 weeks was too small to reach statistical significance ($F_{(2,58)}$=2.43, p<.098). In contrast, the Risk group showed a significant plaque reduction at 4 weeks (from 21.59% at baseline to 12.22%), and at 12 weeks (9.33%). The absolute total plaque reduction in this arm between baseline and 12 weeks was approximately 11%, the difference being statistically significant ($F_{(2,62)}$=24.08, p<.001; eta^2=0.44). The GPS group showed a similar pattern of plaque reduction to the risk group with significant reduction at 4 weeks (from 16.23% to 10.91%), and again at 12 weeks (to 9.65%) ($F_{(2,68)}$=10.26, p<.001).

Bleeding on probing

Bleeding on probing reduced in all three groups across time ($F_{(2,188)}$ = 36.44, p<.001) with a significant interaction ($F_{(4,188)}$ = 2.68, p<.04). The effect size was higher for the intervention groups (GPS $F_{(2,68)}$=10.65p<.001,eta^2=.439; Risk $F_{(2,62)}$=16.75, p<.001; eta^2=0.428) than the controls [TAU ($F_{(2,58)}$=11.23, p<.001, eta^2=0.279].

Previser risk and disease scores

By 12 weeks all three groups reduced their risk scores significantly ($F_{(1.94)}$=16.86, p<.001; eta^2=0.152) with the two intervention groups succeeding in moving their risk scores into the lowest band. A similar pattern was observed with disease scores for all three groups with significant reduction ($F_{(1.94)}$=25.08, p<.001; eta^2=0.211) at 12 weeks.

Probing depths

Probing depths were measured per sextant and the highest probing depth category across the sextants was used to obtain a single rating at baseline and 12-weeks. Probing depths reduced in all three groups [TAU x^2(d.f.=2)=19.52, p<.001; Risk x^2(d.f.=4)=34.46, p<.001)' GPS x^2(d.f.=4)=53.04, p<.001] across time.

---------- Table 2 about here----------

Behavioral outcomes

Self-reported brushing and interdental cleaning

No variation was noted in participants' frequency of self-reported morning or evening brushing in any of the three arms. Participants reported brushing between 2 and 7 days per week, with M brushing frequency of 6 days, irrespective of arm. No difference was noted at 4 or 12 weeks in frequency of self-reported morning ($F_{(2.188)}$=.50, p<.60) or evening brushing ($F_{(2.188)}$=2.72, p<.07).

Frequency of morning-performed interdental cleaning increased across time for the two intervention groups (effect size eta^2=.306) from Risk M=2.59 (SD=2.79) at baseline to M=4.59 (SD=2.66) at 12 weeks ($F_{(2.62)}$=14.05, p<.001) and GPS M=4.00 (SD=2.55) at baseline to M=5.29 (SD=2.19) at 12 weeks ($F_{(2,68)}$=13.41, p<.001). The control group did not change across time ($F_{(2,58)}$=2.70, p<.08).

Frequency of evening interdental cleaning did not change significantly in either the control group ($F_{(2,58)}$=3.07, p<.07), or risk group ($F_{(2,62)}$=3.04, p<.06). However, the GPS group improved signifi-

cantly from baseline (M=4.94, SD=2.27) to 4 weeks (M=5.60, SD=2.21) to 12 weeks (M=5.83, SD=1.90; $F_{(2,68)}$=6.94, p<.013).

Psychological variables

Means (SDs) for these outcomes are shown in Table 3.

-------- Table 3 about here-------

All participants thought post-consultation that periodontal disease was more serious than previously thought, a change maintained at 4 and 12 weeks across all groups ($F_{(3.282)}$=21.87, p<.001, eta^2=0.18). A significant interaction was seen in susceptibility where the TAU group believed they were more susceptible to periodontal disease post-consultation (M=9.00, SD=.91), whilst both intervention arms believed that they were slightly less susceptible to the disease, post consultation ($F_{(6, 282)}$ =2.06, p<.05; eta^2=0.04). In terms of treatment effectiveness, all three groups believed treatment to be very effective and certainly more effective post-consultation than they thought before ($F_{(3,282)}$=6.13, p<.01; eta^2=0.06). Similarly, with self-efficacy people's belief in their own ability to control periodontal disease was high at baseline and increased post-consultation for all groups ($F_{(3,282)}$=4.39, p<.01; eta^2=0.045). Fear of periodontal disease rated low at baseline, with all groups slightly more fearful post-consultation ($F_{(3,282)}$=3.68, p<.013; eta^2=0.038) than at baseline. Intention to adhere to periodontal treatment did not change across time ($F_{(3,282)}$=2.23, p<..09) or across intervention arms ($F_{(2,94)}$=.22, p<.80, eta^2=0.05).

Discussion

This study explored the effect of using personalized disease risk information, either supplemented with goal setting, planning and self-monitoring or not, on clinical and self-reported behavioral outcomes in primary dental care. The work builds on and extends our previous RCT that exam-

ined the effects of personalized periodontal disease risk information on psychological outcomes within primary dental care.

Plaque reduced significantly in both Risk and GPS groups, but not the TAU group. Bleeding on probing reduced across all three arms but the effect was higher for the intervention groups. Probing depths, risk and disease scores reduced similarly in all groups. This evidence supports the notion that a simple behavioral intervention using personalized risk information and a standard behavior change script, delivered by a dentist, can lead to statistically significant improvements in plaque scores sustained at 12 weeks. This work adds to previous behavioral work seeking to improve periodontal disease outcomes[3]. The additional strength of this study lies in the fact that the behavioral intervention was delivered by a dentist rather than a psychologist, within a usual consultation appointment time. The clinical significance of the changes achieved remains to be determined.

Brushing frequency was high initially and no further changes were observed post-baseline. Interdental cleaning frequency improved in the intervention groups. The risk and GPS groups reported increased interdental cleaning frequency in the morning, whilst only the latter group succeeded in enhancing their interdental cleaning frequency in the evenings. Interdental cleaning frequency remained unchanged in the TAU group. This is an encouraging set of findings suggesting this simple, behavioral intervention may effectively increase interdental cleaning in patients who brush regularly. Future work should explore whether the findings could be replicated with a younger, less adherent sample.

The sample showed changes in most psychological variables regardless of study arm, their responses possibly demonstrating a Hawthorne effect. Nevertheless, people thought post-consultation that periodontal disease was more serious, they were more fearful of it, believed their treatment was more effective than pre-consultation and felt better able to adhere to dentist's instructions. The only interaction in these data suggested that whilst the TAU group felt more susceptible to the adverse effects of periodontal disease post-consultation, the two intervention groups were more re-assured post consultation. People's intention to adhere to dentist's advice remained high throughout in all groups and showed no change as a result of the intervention.

Although this pattern of results is similar to work we have reported previously[3], where giving disease risk information to patients might prepare them psychologically to change their behavior, these findings need to be interpreted cautiously in light of the moderate reliability of the scale used.

Limitations of this study included participants' age and socio-economic status. The clinician in this study was experienced, had postgraduate qualifications and a keen interest in delivering an evidence-based psychological intervention. Although the intervention did not make additional demands on clinical time it was delivered within a 30-minute consultation. Although we have no reason to believe that the scripts underpinning each intervention arm were not adhered to, however, future work should consider formally assessing protocol adherence. In addition, blinding may have been unintentionally broken at T2 and T3, and this issue could be avoided in future work by having an independent clinician recording outcomes at follow-up. Finally, the study did not seek to compare behavioral vs. traditional periodontal therapy outcomes; future research might wish to explore this issue. This mixed study design, with between group and repeated measures elements, raises questions as to whether Analysis of Covariance should have been used to control for baseline values. This is a topic of some debate [19, 20] with detailed statistical arguments as to why the use of covariates in a study design such as ours is not a sound strategy. To this end we believe that analytical strategy reported here is the most appropriate one.

The study has shown that, in line with Newton and Asimakopoulou's earlier systematic review[21]

interventions that utilize principles of GPS might successfully improve clinical outcomes in periodontal disease in an older sample of generally adherent patients. Jonsson and colleagues [22-26] have demonstrated the benefits in terms of plaque reduction and decreased bleeding on probing of individualized patient communications which include goal setting and discussion of individual risk factors. The benefits sustained in these latter studies were maintained at two years. In contrast to the present study, in the studies conducted by Jonsson and colleagues the intervention was delivered by a dental hygienist and took more clinical time than the brief interventions introduced here.

Conclusions

A simple behavioral intervention using individualized periodontal disease risk communication, with or without Goal-Setting, Planning and Self-Monitoring reduced plaque and bleeding and increased interdental cleaning over 12 weeks.

Acknowledgments

The authors would like to thank Tara Clarke Mackean of Merivale Dental Practice for her assistance in managing this study and all the patients who generously volunteered their time. They would also like to acknowledge the Oral and Dental Research Trust and King's College London for funding this study. There are no conflicts of interest for any authors.

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Figure legend

Figure 1: CONSORT 2010 Flow Diagram

Table 1: Descriptive statistics for plaque, bleeding, risk and disease risk outcomes

Baseline

	TAU (N=32)			Risk (N=32)			GPS (N=33)		
	Mean	**SD**	**CIs**	**Mean**	**SD**	**CIs**	**Mean**	**SD**	**CIs**
Plaque %	13.97	10.30	10.12-17.8	21.59*	15.49	16.01-27.1	16.23*	10.54	12.61-19.85
Bleeding %	8.62*	6.13	6.35-10.9	13.89*	14.88	9.41-20.3	9.94*	7.33	7.42-12.46
Previser Risk score	2.20	1.35	1.70-2.70	2.22	1.18	1.79-2.64	2.25	1.17	1.85-2.66
Previser Disease score	20.17	24.53	11.00-29.3	20.69	22.81	12.47-28.9	19.14	22.41	11.44-26.84

Time 2 (4-weeks)

	TAU (N=32)			Risk (N=32)			GPS (N=33)		
	Mean	**SD**	**CIs**	**Mean**	**SD**	**CIs**	**Mean**	**SD**	**CIs**
Plaque %	10.87	7.22	8.17-13.5	12.21*	9.33	8.85-15.5	10.91*	9.90	7.51-14.31
Bleeding %	4.37*	3.64	3.01-5.73	5.44*	6.40	3.13-7.74	6.11*	7.80	3.44-8.79

Time 3 (12-weeks)

	TAU (N=32)			Risk (N=32)			GPS (N=33)		
	Mean	**SD**	**CIs**	**Mean**	**SD**	**CIs**	**Mean**	**SD**	**CIs**
Plaque %	10.60	7.66	7.73-13.4	9.87*	7.93	7.01-12.7	9.65*	8.06	6.88-12.42
Bleeding %	4.17*	5.51	2.10-6.22	6.72*	7.03	4.18-9.25	4.42*	4.23	2.97-5.88
Previser Risk score	2.00*	0.98	1.63-2.37	1.87*	1.07	1.50-2.25	1.82*	1.01	1.45-2.21
Previser Disease score	14.97*	18.69	7.98-21.9	17.06*	21.10	9.45-24.6	13.14*	15.86	7.69-18.59

Key:

*= $p<.01$ across time

Table 2: Pocket depth (in mm) patient frequencies (N) by study arm and time of measurement (Baseline vs. Time 2)

		Baseline	
	TAU	**Risk**	**GPS**
< 5mm	18	24	20
5-7 mm	8	6	12
7+mm	4	2	3
		Time 2 (12-weeks)	
	TAU	**Risk**	**GPS**
< 5mm	23*	28*	27*
5-7 mm	7*	3*	7*
7+mm	0*	1*	1*

Key:

*= $p<.01$ across time

Table 3: Descriptive statistics for thoughts about periodontal disease (PD), as assessed by the PMT measure. Higher scores indicate stronger beliefs.

Baseline (pre-consultation)

	TAU (N=32)			Risk (N=32)			GPS (N=33)		
	Mean	**SD**	**CIs**	**Mean**	**SD**	**CIs**	**Mean**	**SD**	**CIs**
PD Seriousness	7.03	1.75	6.38-7.68	7.28	1.85	6.61-7.95	7.88	1.84	7.25-8.52
PD Susceptibility	8.37	1.54	7.79-8.94	8.72	1.65	8.12-9.31	8.54	1.96	7.86-9.22
PD Treatment effec-tiveness	8.17	1.51	7.60-8.73	8.81	1.69	8.20-9.42	8.83	1.07	8.46-9.20
Self-efficacy about controlling PD	8.53	1.36	8.03-9.04	8.59	1.39	8. 09-9.09	8.69	1.30	8.24-9.13
Fear about PD	5.97	2.25	5.13-6.81	6.19	2.43	5.31-7.06	6.34	2.60	5.45-7.24
Intention to adhere tc dentist advice	8.90	.80	8.60-9.19	9.22	.75	8.95-9.49	9.20	1.08	883-9.57

Baseline (post-consultation)

	TAU (N=32)			Risk (N=32)			GPS (N=33)		
	Mean	**SD**	**CIs**	**Mean**	**SD**	**CIs**	**Mean**	**SD**	**CIs**
PD Seriousness	8.13	1.57	7.55-8.72	8.53	1.68	7.92-9.14	8.54	2.00	7.85-9.23
PD Susceptibility	9.00	.91	8.66-9.34	8.28	1.81	7.63-8.94	8.43	1.96	7.76-9.10
PD Treatment effec-tiveness	8.93	1.05	8.54-9.33	9.25	1.24	8.80-9.70	9.25	.95	8.93-9.59
Self-efficacy about controlling PD	8.83	.87	8.51-9.16	9.06	.95	8.72-9.40	9.11	.1.08	8.74-9.49
Fear about PD	6.73	2.11	5.94-7.52	6.59	2.38	5.73-7.45	6.94	2.73	6.00-7.88
Intention to adhere tc dentist advice	9.10	.76	8.82-9.38	9.41	.79	9.12-9.69	9.40	.98	9.06-9.74

	Time 2 (4-weeks)								
	TAU (N=32)			Risk (N=32)			GPS (N=33)		
	Mean	SD	CIs	Mean	SD	CIs	Mean	SD	CIs
PD Seriousness	8.07	1.55	7.49-8.64	8.22	1.66	7.62-8.82	8.40	1.69	7.82-8.97
PD Susceptibility	8.53*	1.31	8.05-9.02	8.81*	1.06	8.43-9.20	8.69*	1.34	8.11-9.26
PD Treatment effectiveness	8.80*	1.03	8.42-9.18	9.25*	0.98	8.90-9.60	9.09*	1.31	8.63-9.53
Self-efficacy about controlling PD	8.53*	1.50	7.97-9.09	8.72*	1.37	8.22-9.21	8.88*	1.18	8.48-9.30
Fear about PD	6.43*	2.13	5.64-7.23	5.78*	2.82	4.785-6. 08	6.57*	2.70	5.64-7.50
Intention to adhere to dentist advice	9.17	.6070	8.91-9.43	9.13	1.00	8.76-9.49	9.08	1.63	8.52-9.65

	Time 3 (12-weeks)								
	TAU (N=32)			Risk (N=32)			GPS (N=33)		
	Mean	SD	CIs	Mean	SD	CIs	Mean	SD	CIs
PD Seriousness	8.00*	1.70	7.36-8.64	8.34*	1.61	7.76-8.93	8.43*	1.52	7.83-9.03
PD Susceptibility	8.53	1.17	8.10-8.97	8.81	1.40	8.31-9.32	8.60	1.52	8.08-9.12
PD Treatment effectiveness	8.77	1.43	8.23-9.19	9..28	.77	9.00-9.55	8.97	1.38	8.49-9.44
Self-efficacy about controlling PD	8.37	1.75	7.711-9.02	8.50	1.70	7.89-9.11	8.74	1.01	8.26-9.22
Fear about PD	6.40	2.13	5.61-7.19	6.16	2.37	5.30-7.01	6.77	2.94	5.76-7.78
Intention to adhere to dentist advice	9.13	.82	8.83-9.44	9.16	1.05	8.77-9.54	8.86	1.87	8.22-9.50

Key:

*= p<.01 across time